Rock Products

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MEMBER A.B.C. — *The Only Paid Circulation in this Industry* — MEMBER A.B.P.

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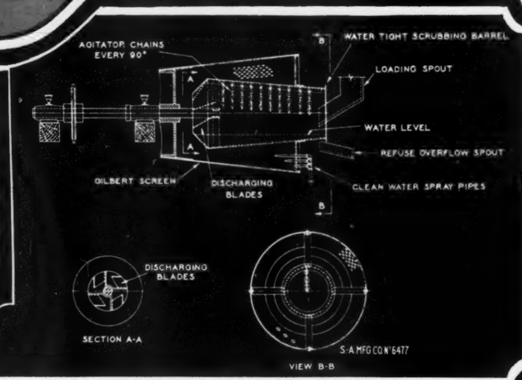
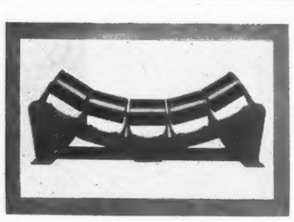
MORE *and* CLEANER GRAVEL





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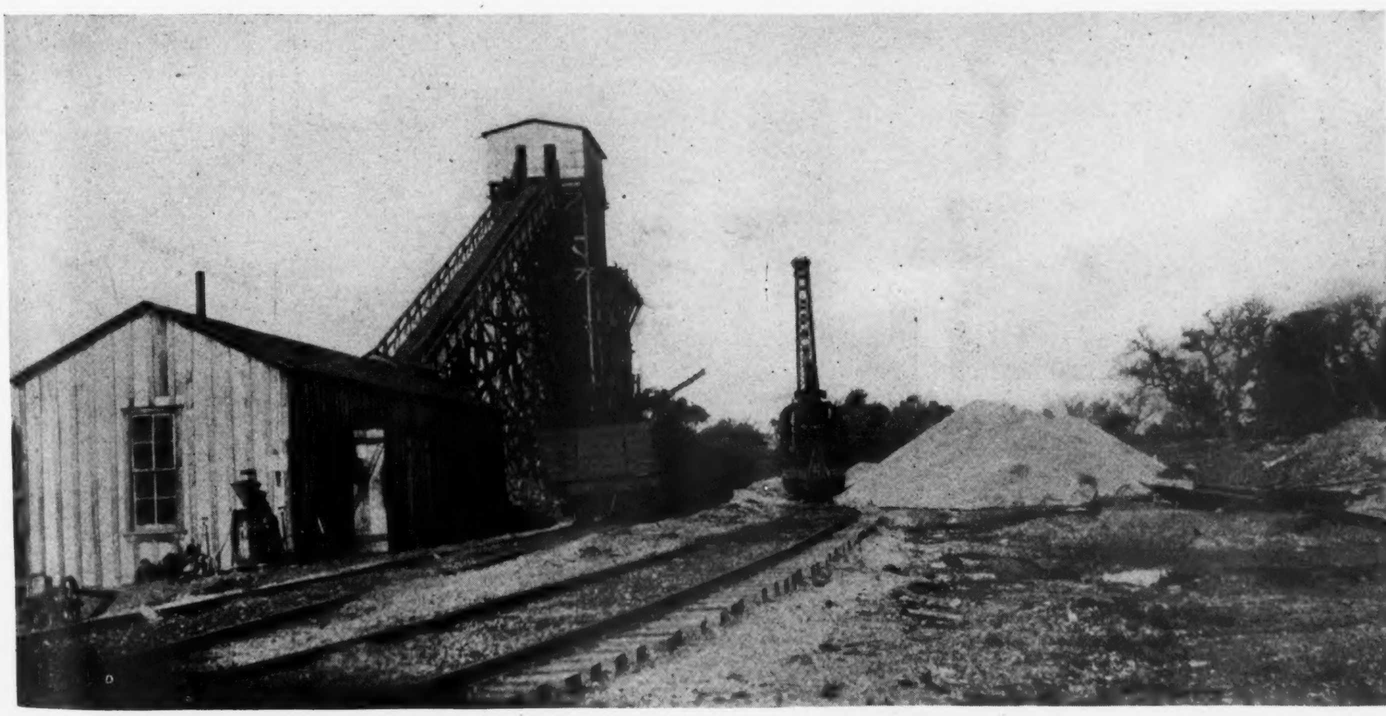
Working an Old River Channel in Texas for Sand and Gravel

Potts-Moore Gravel Company with a Production of 2000 Tons Per Day of Washed Material One of the Largest Operators in the State

THE plant of the Potts-Moore Gravel Co., at Waco, is said to be the largest sand and gravel plant in central Texas, which includes a large area and also a number of good sized towns. It has a production of 2000 tons daily and has been in operation since 1921. Waco, which is on the Brazos river, has a considerable area of sand and gravel deposits in and around the city and several companies, large and small work them, but much of the production is of pit run material. The Potts-Moore Co. has the only plant producing washed material on a large scale.

The deposit appears to be an old river channel. It has been worked from bank to bank, a distance of perhaps 1000 ft., and on either side the workings expose old limestone bluffs which show the marks of water erosion. Borings have shown that limestone underlies the deposit everywhere. The sand and gravel is stratified and averages about 30 ft. thick. There is very little oversize, not enough to pay for crushing. Most of the pebbles examined were hard flints, possibly derived from limestone beds of a much earlier period than those exposed in the workings.

The digging equipment consists of two Marion steam shovels and a Monaghan 2-T walking dragline. The last named is the machine most depended upon for supplying the plant, but it was being overhauled when the plant was visited and the ground was being worked by a steam shovel in the part above water. The dragline has a 70-ft. boom



View of Potts-Moore Gravel Co.'s plant at Waco, Tex., showing the locomotive crane loading from the stockpile

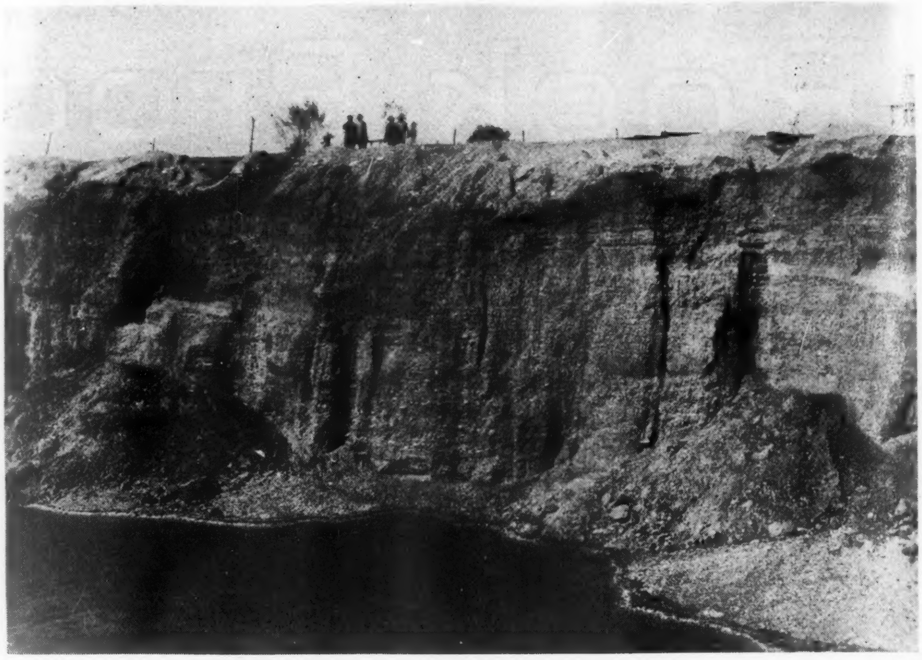
and a 2½-yd. bucket and it is powered by a 70-h.p. Charter gas engine.

The steam shovels are No. 60 and No. 61, the first having a 2½-yd. dipper and the second a 2-yd. dipper. Both are of the railroad type and the No. 61 has boom of extra length.

A 25-ton Bay City Industrial crane is an important part of the equipment since it handles a large part of the production from the "sumps" or underground bins of the plant to the stockpiles or into cars. This crane is provided with a Blaw-Knox clamshell bucket of the "speedster" type, 1½ cu. yd. capacity.

The bank material is brought to the plant in 12-yd. side dump "Western" cars, of which 12 are in service. Two 60-ton Baldwin locomotives are used to pull in the trains and all this equipment is of standard gage. The water here is very hard and scales boilers and tubes rapidly, so a water softening plant has been recently installed to provide good water for the locomotives.

The cars are dumped into a track hopper



Face of deposit at one of the deepest parts and which extends below the water

End view of the plant

which is 12x24 ft. on top. At the bottom are two Stephens-Adamson feeders of the pan-conveyor type. These feed to a 30-in. conveyor belt, with 250-ft. centers, which takes everything to the washing and screening plant. This belt is driven by the main plant motor and is provided with a gravity take-up.

The discharge from the belt falls into a box, about 6 ft. deep and long, which breaks the fall and prevents wear. From this box it flows into the scalping screen, which is a plain, cylindrical screen 48 in. by 12 ft., with 3-in. perforations. The oversize of this screen is sent to waste.

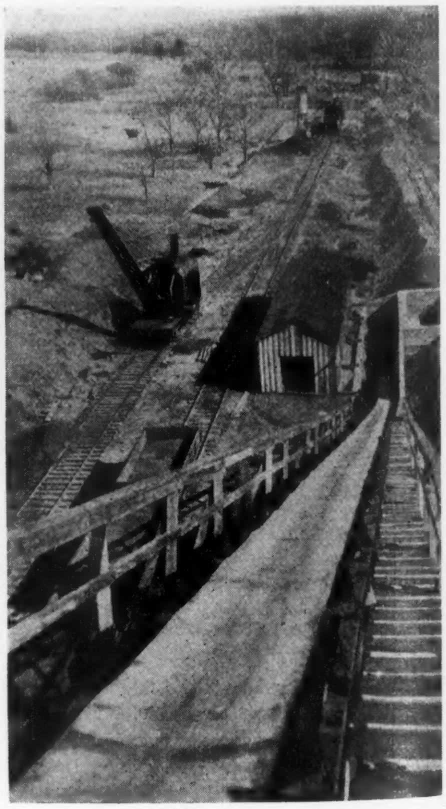
The undersize goes to two rows of three each 84-in. Gilbert screens in series. The first has 1-in., the second 7/16-in., and the third 7/32-in. perforations. All these screens are 84 in. in diameter at the larger end, and all are provided with washing spray pipes of the type used with this screen.

These screens make three sizes of gravel and one of sand (minus 7/32 in.). The sand, with the water accompanying it, goes to two Good Roads Machinery Co.'s sand boxes with drag chain for recovering the sand, and the dewatered sand is sent to a bin or to cars. The overflow of this sand box is used at times to give a preliminary wash at the scalping screen.

Looking toward the track hopper and feeder to washing plant

There are no bins of the usual kind at the plant, but there are concrete "sumps" or tanks between the plant and the track, the bottom being several feet below the track level. This arrangement was adopted to save head room. Two of these sumps are 10x10 ft. and the third 10x24 ft. They are filled by chutes which lead from the screens and which are also used in loading directly into cars. These sumps are emptied by the crane either into cars or to stockpiles on the other side of the track.

A considerable part of the business of the plant is in mixed sizes and the chutes are arranged so that mixtures may be easily made. The chutes from the screens pass over a swiveled spout and gates allow the



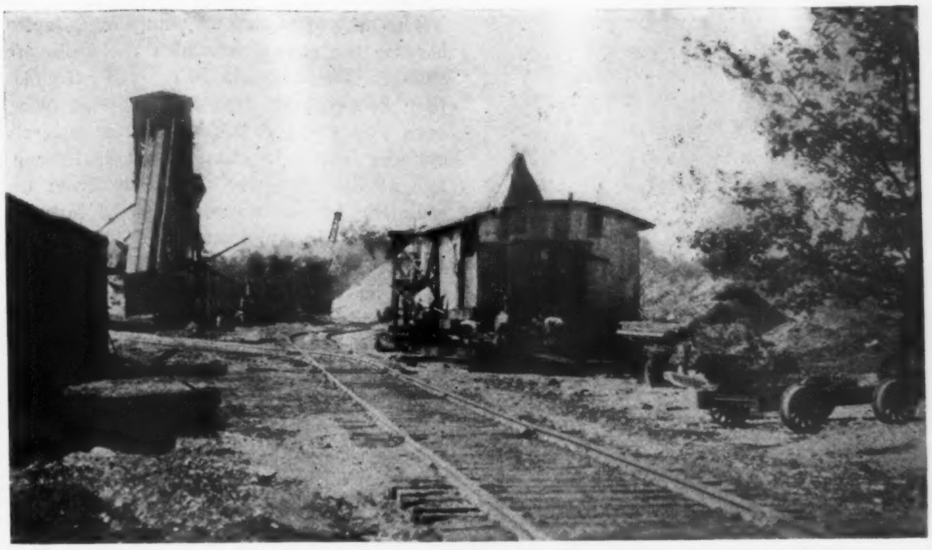
Looking down the belt conveyor to the track hopper

feed to go in any quantity from these to the swiveled spout by which it is loaded into cars. Sand is brought to the same swiveled spout from the sand box by a chute, water being added to make the sand flow. Ordinarily, the materials are chuted direct to the cars from the screens, the sumps being used only to take up the slack or for special orders or for storage.

Besides washed sand and gravel, a considerable business is done in loading pit run for railroad ballast.

Gravel and sand are of excellent quality and the reputation of the product extends far beyond Waco and its surroundings. For this reason shipments are made to points at considerable distances, wherever aggregate is wanted for a really important job.

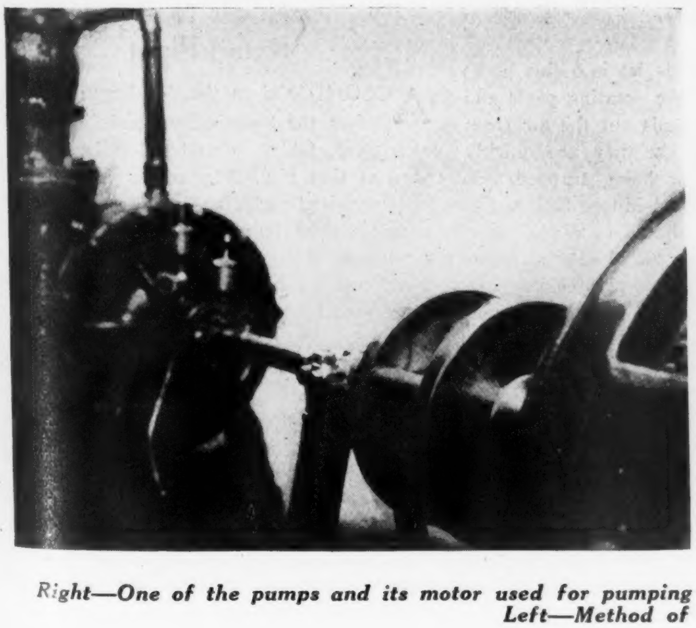
The plant is located on the M., K. & T. R. R. within the switching limits of Waco, and shipments are made over the following railroads on one-line freight rate: M., K.

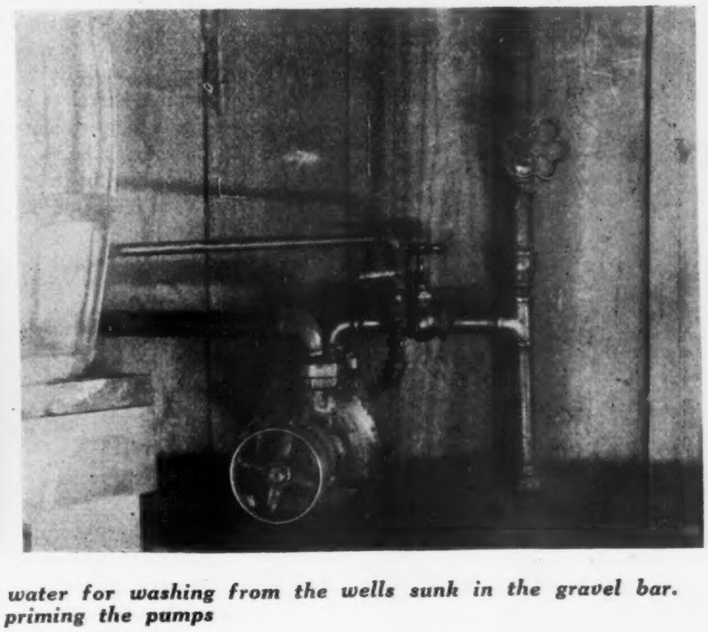


Overhauling the dragline

Plant structure and conveyor from railroad hopper

Steam shovel working part of the ground above water





Right—One of the pumps and its motor used for pumping water for washing from the wells sunk in the gravel bar. Left—Method of priming the pumps

C. W. Crisler, secretary-treasurer and general manager, Potts-Moore Gravel Co.

& T.; H. & T. C.; G. H. & S. A.; I. & G. N.; St. L. & S. W.; G. C. & S. F.

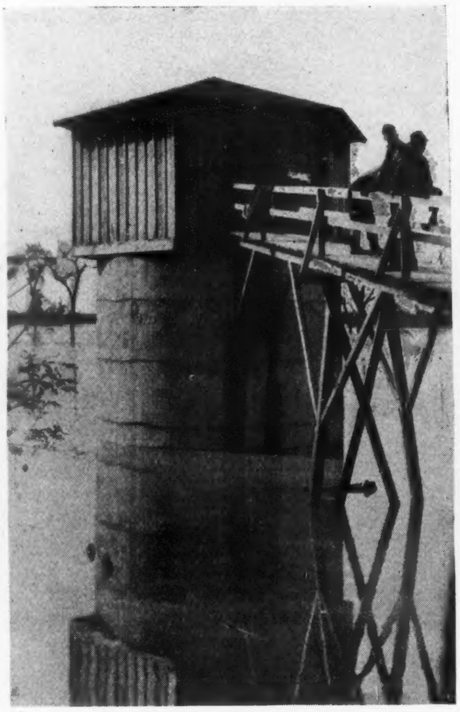
Water Supply

The water supply is one of the most interesting features of this plant. The water comes from two wells sunk in a gravel bar near the Brazos river which flows by the plant. The river water is often muddy, but the sand and gravel in the bar provide an excellent filtering medium. A 10-in. pipe from these wells serves as a common suction for two 6-in. American deep-well pumps which are placed in the bottom of a concrete cylinder, 16 ft. in diameter inside, and 38 ft. deep. This was made by using an ordinary concrete silo form, expanding the outside sections so as to make a wall 12 in. thick. On top of this cylinder is a small house, and this is connected with the high ground on which the plant stands.

Pumps are placed at the bottom of this 38-ft. concrete cyilnder which has at times been almost completely submerged

This way of placing the pumps was adopted because the ground in which the wells are sunk is often flooded. It has several times been flooded since the pumps were in place, once to a depth of 33 ft., but the concrete cylinder held tight except for a little seepage at the start which took up from the sediment in the water. A chain hoist is in place in the house on top of the cylinder so that the pumps could be pulled up in case the cylinder was flooded, but it has never been used.

Each pump is direct-connected to a 75-h.p. General Electric motor. Only one pump is used at a time as either will throw sufficient water for the needs of the washing plant. The manner of priming the pumps is somewhat unusual. They are connected to a "Hytor" vacuum pump made by the Nash Engineering Co. A little water is let into this pump from a barrel to seal the rotating parts and the vacuum produced pulls out the air from the pumps below so that they are quickly primed without any air being trapped.



Pump house during a period of high water

The offices of the Potts-Moore Gravel Co. are in the Amicable building in Waco. Two of the principal owners, R. J. Potts, president, and W. H. Prentice, vice-president, are very well known as railroad contractors and builders throughout the Southwest. The company is a member of the National Sand and Gravel Association and Mr. Potts is one of its directors and also a member of important committees. C. W. Crisler is secretary-treasurer and general manager in charge of the operation. B. E. Prickette is field superintendent. The plant was designed and most of the machinery was furnished by the Stephens-Adamson Co. of Aurora, Ill.

Graveled vs. Paved Roads

OUR MAIN TRUNK line highways and sections of other primary roads, in Iowa, in the vicinity of large population centers, now carry such a volume of traffic that they should be paved. The decreased cost of operating the traffic on these roads over a pavement as compared with a gravel surface is sufficient to make it economical to pave these roads. After a road is built to grade, the first cost of a paved surface as compared with a gravel surface is about six or eight to one. For this reason, in view of the limited funds available and the great necessity for some kind of surfacing on a large mileage, which will make our roads usable even though it rains, we have adopted the graveling program outlined herein. The graveling of these heavy traffic roads should be regarded as a temporary improvement to tide us over and keep traffic out of the mud until such time as a more durable type of surface can be had, not only on important roads included herein for graveling, but also on many other roads of the same class which have heretofore been graveled.

The maintenance cost of a graveled surface on many of the roads herein proposed for graveling will be quite high—perhaps six or eight times the cost of maintaining pavements on these roads. On some of these roads, as for example, primary road No. 6 north of Council Bluffs, it may prove to be impossible to maintain a gravel surface in good condition, regardless of how much may be spent for such maintenance work. Time will determine these matters and if the gravel should prove inadequate, it will be apparent to all that paving is the only solution. In the meantime, the gravel will have paid for itself in decreased cost of motor vehicle operation over the roads and keeping traffic out of the mud.—*Service Bulletin*, Iowa State Highway Commission.

Oklahoma Sand and Gravel Producer to Build Retail Plant

ACCORDING to the Muskogee (Okla.) News, the Yahola Sand and Gravel Co., Muskogee, Okla., is to build a large retail yard at that city. The site is said to have been acquired and plans made for the erection of three buildings, an office building, a number of open storage pits, and a large warehouse to hold more than 10 carloads of cement. A spur from the tracks of the Frisco railroad has been laid into the grounds on which officials of the company will build. It is planned to install an unloading tractor crane at a cost of about $13,000. The proposed plant is said to involve an expenditure of over $30,000.

The Yaholo company produces over 2000 tons of river sand and flint gravel per day from plants operating at Muskogee and Dill, Okla. It is owned and operated by Walter and Charles Dills and associates.

Observations on the Aggregate Industries in Florida

Use Being Made of Such Natural Materials as to Be Had— Demand for Cleaner Aggregate Promotes Growth of Washing Plants

By Edmund Shaw
Editor, Rock Products

WHEN you ask any construction man or engineer who should be familiar with such matters of what they make concrete in Florida, the answer comes back very promptly, "of anything that they can get!" When you press for details you hear of weird mixtures that give you a distinct shock, especially if you have spent some years in advocating the use of clean, screened and well-graded aggregates of structurally sound materials. You get a worse shock when you actually see some of the materials used, as for example when you see a mixture of sea shells and sand scraped up from the beach and thrown into the mixer to make a concrete road through a new "development."

Florida has used concrete in enormous quantities during its building boom. The 234 cement product plants of the state would of themselves account for a large production of aggregate. No great mileage of concrete roads has been built, as compared with some other states, but still there is enough to have used many thousand yards of material. And in general construction, in bridges, business blocks, hotels, and residences, the cement and aggregate consumption has been almost incredible. Concrete goes into everything. The cheapest frame shack is set on concrete pins (precasting them is a regular industry) and portland cement stucco is the favorite surfacing for any kind of a building.

Aggregates of excellent quality brought in

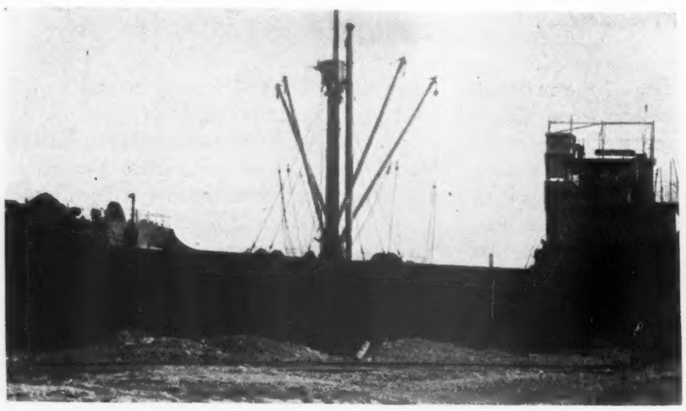
Dredge used for pumping fine sand. Note settling boxes above deck house

Crawler tread crane mounted on flush deck barge which is used as a dredge for oyster shells

Loading oyster shells to be used as aggregate at St. Petersburg, Fla.

Loading from stock piles at Tampa Sand and Shell Co., St. Petersburg

from outside states were used as fast as the railroads could bring them in, but the supply could not begin to equal the demand so local aggregates had to be found. But perhaps no state in the United States is so short of the usual aggregate materials as Florida. The geology of the state is such that there are none of the usual sources of aggregate if we except the sand and gravel deposits in the northwestern corner. But in this day and age people will find a way to build regardless of difficulties, as the ruins of old cities show they always have done. mixture of cement and aggregate will make as strong a concrete as cement will of itself. For a given strength good aggregates need less cement than inferior aggregates. As an ordinary example which illustrates this fact, take the making of cement blocks. With the good clean aggregates which are so abundant in northern states a mixture of 1 to 7 is considered fairly good. Mixtures of 1 to 11 and even leaner are not unknown where building codes will permit. But blocks are made in Florida with fine sand and cement in a 1 to 3 mix and even a 1 to 2½ mix has to break down into stream gravels. Only in the region close to the Alabama line do such gravels exist. The state except for the clay and sand formation in the center is all limestone and marl, but the limestones are soft as compared with the older limestones in the northern states. Sand exists in abundance, but most of it is the "native" sand, as it is called when it is used for making concrete, which is as fine as flour. In a few places which will be mentioned, really good sands may be found and there is a limited amount of stone that is crushed to make a



A gravel carrier at the docks of the Ocean Stone and Gravel Co.

Re-piling gravel at Ocean Stone and Gravel Co.'s docks

Steam-driven unloading machine used at the Ocean Stone and Gravel Co.'s docks

Close-up of unloading machines used at the Ocean Stone and Gravel Co.'s docks

Lacking familiar materials, they turned to unfamiliar materials, and somehow made them serve. And this is the reason for the use of fine sands, shells, hardened marls, and some of the other strange things that have been made into concrete in Florida.

Clean Aggregate in Good Demand

However, good clean screened and graded aggregates were never so much appreciated as they are now by the men who have been making concrete of unusual materials. They require so much less cement. The primary reason for using aggregate is one which those of us who are closest to aggregate production are apt to forget, and that is that aggregates have no strength in themselves and are only used to save cement. No been used in some cases. The strong demand for blocks has raised the price in some localities to where such a rich mix may be used and some profit made. Of course every effort is made to use the least cement with the material at hand, and the dishonest block maker gets by with as little cement as possible. But I saw very little poor concrete in Florida, even where inferior aggregates had been used. The cement content had been increased until the necessary strength was obtained.

Aggregate Materials Are Varied

Florida is hard up for aggregates on account of its origin. Of course it lies far south of the glacial region and it never had any hills and mountains of crystalline rocks very satisfactory coarse aggregate.

A list, which does not pretend to be complete, of materials used for aggregate in Florida may be of interest. It includes the following:

Materials of Native Origin: Very fine native sand, oyster shells, coquina (shell rock), silica sand of varying fineness, by-product sands from washing china clay and phosphate rock and the excellent sands from the river beds in the north and deposits in the south central part of the state. These are fine and mixed aggregates. The coarse aggregates of native origin include: Crushed Brooksville limestone, crushed field rock, Ojus rock, flint, hardened marls, and the stream gravel of the northwestern part of the state. Low-grade pebble phosphate rock

is also used to some considerable extent.

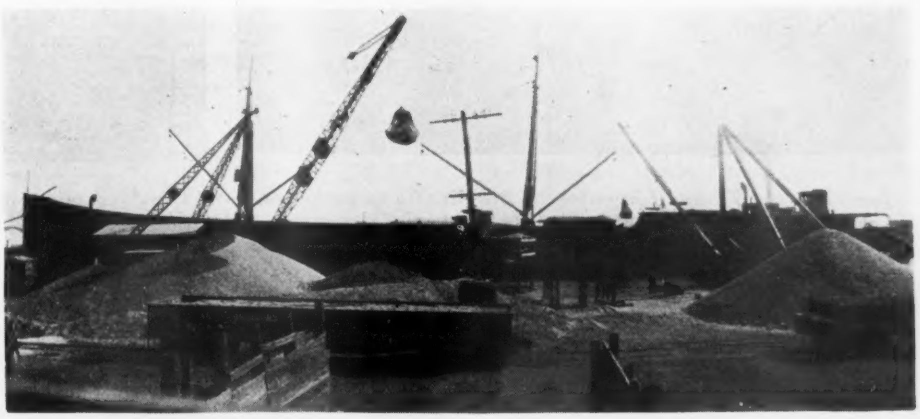
Materials Imported from Other States: Sand from Montgomery, Ala., and a few other points. Not much sand is imported as compared with coarse aggregates which include: Crushed granite from Columbia, S. C., crushed slag from Birmingham, gravel from Montgomery, crushed gravel from Macon, Ga., and from quarries on the Hudson river in New York, gravels from Mobile, Ala., Newport News, Va., Baltimore, Md., and perhaps other points from which gravel may be shipped by water.

It is worth noting that the imported aggregates are those which have a reputation that goes far beyond the locality in which they are produced. Everyone who knows anything about aggregates in the United States knows of the limestones produced in the Hudson river quarries, Montgomery gravel, Birmingham slag, and Columbia granite. These and the others mentioned are all of the highest quality and are shipped to many places besides Florida. Birmingham slag and Montgomery gravel, for example, are shipped all over five states. The reasons why more of these materials are not used in Florida is that there has been no way to get them into the state, and of course the supply would be unequal to the demand if only these materials were used.

In addition to the materials mentioned, special aggregates used for cement products are cinders in such quantity as they can be had, and the soft Ocala limestone, which is principally used in making artificial stone for cutting.

Dredging for Sand and Shell in Wide Use

The very fine native sand (all of which loads as though it would pass 50 mesh) I saw being dredged near Tampa and St. Petersburg. The same concern which produced it, the Tampa Sand and Shell Co. also dredges oyster shells from Tampa bay. One of the men at the dock said the original purpose of dredging was to get material for shell roads, but people at once began buying both sand and shell for making concrete. The dredge for shells is certainly unique. It consists of a gas-driven locomotive crane on a flush deck barge. The crane is on crawler treads and when it starts to load it is about in the center of the barge. As it loads the shell on the front end it moves back so as to keep the barge level. The same crane unloads the barge, moving toward the center as it does so in order to trim the boat. The scheme is ingenious, but of course for efficiency and capacity it cannot be compared with a properly built bucket dredge. The sand sold from this plant was secured by an 8-in. pump dredge, gas-engine driven with a settling box for the sand above the deck house. The machinery is at one end of the dredge and the greater part of the deck space is occupied by a cargo box into which the sand is run.



Unloading Mobile gravel from a 5000-ton freighter at the dock of the Tampa Coal Co.

By-Product Sands Make Excellent Aggregate

By-product sands are produced in large tonnages. Those which are left from the washing of china clay are practically pure silica and look like coarse sugar. As Leesburg is near the center of this industry, they are usually spoken of as Leesburg sands. Two of the largest producers are the Leesburg Sand and Supply Co. and the Acme Sand and Supply Co. These are among the largest sand producers in Florida. Although the sand looks fine-grained to eyes accustomed to the glacial drift sands, the modulus of fineness is higher than one would guess it to be on account of the high percentage of medium-sized grains. It makes an excellent fine aggregate.

Somewhat akin to these sands is the Lake Wier sand, much used in the central part of the state. It is highly siliceous, but it has a purplish tint when looked at in the mass. The grain sizes seem to be somewhat coarser than those of the Leesburg sands.

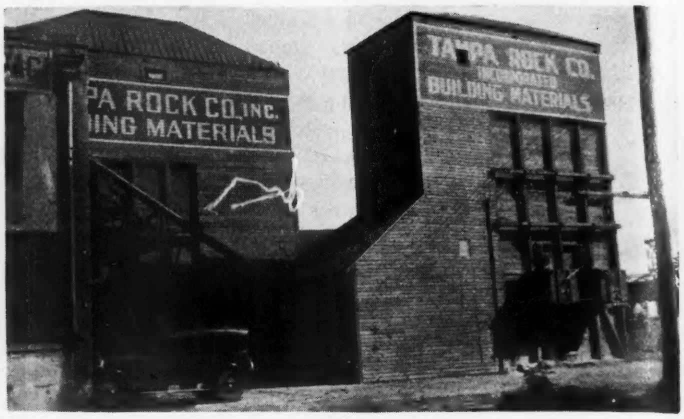
The by-product sands produced in the phosphate rock field are now being shipped in large amount. Phosphate rock occurs in a "matrix" which is a mixture of clay and sand. In washing phosphate rock, the clay is removed as an overflow, but the sand stays with the phosphate until the last operation which consists in passing the mixture over a 1/8-in. or a 3/32-in. screen. The undersize of this screen is sand and a little fine phosphate rock. This has been stored for years in immense piles near the phosphate washing plants, some of which are being reclaimed and washed and sold for fine aggregate.

Stock pile of crushed limestone and screenings from the quarries of the New York Trap Rock Corp. at a Tampa yard

Picking oyster shells from Mobile gravel at yard of Tampa Coal Co.

The American Cyanamid Co. produces a lot of this sand at its plant at Brewster, Fla., and this is known in the market as

Quarrying the Tampa formation at Brooksville to make concrete aggregate; Camp Concrete Rock Co.'s quarry



Crushing plant of Tampa Rock Co. in which field stone and flint brought in from Ocala and other points is crushed

Brewster triple-washed sand. It is classified by "boiling over," in a series of boxes, the overflow being discarded to get rid of minus-50 material.

The fineness modulus is said to be around 2.5. The grading of one sample was:

Through 100 mesh	2.4%
Through 50 mesh and on 100 mesh	10.3%
Through 20 mesh and on 50 mesh	54.9%
Through 4 mesh and on 20 mesh	32.4%

Mortar tests (1 to 3) made by the C. Nutting Co. of Cincinnati, showed an average tensile strength of 353 lb. in 7 days and 450 lb. in 28 days. This was 139.5% of the tests on standard Ottawa sand used for comparison for 7 days and 142% for 28 days. It is quite evident that such sand will stand comparison with that produced anywhere in the country.

The use of low-grade pebble phosphate, which may be considered a by-product of the phosphate fields, as coarse aggregate has not been so successful. There is a prejudice against it on account of its containing phosphoric acid which it has been feared might attack reinforcing. Of course such a prejudice is quite groundless, as all the phosphoric acid present is thoroughly satisfied with lime, and it can hardly be freed while mixed with cement. A more valid objection is that some of the phosphate rock is soft.

Good Sand Plentiful, but Limited to Few Localities

The natural sands produced by the Diamond Sand Co. at Lake Wales and the Hesperides sands and the sands from the river beds along the north line of the state are all excellent concrete sands and would be approved as such by any state highway department or other body of the kind. They contain the usual amounts of grains between 8-mesh and 4-mesh and have a modulus of fineness around 3.0. The interesting methods by which the Diamond Sand Co. recovers and classifies its sand was described in Rock Products for December 12.

A study of the aggregate resources of the state leads one to believe that there is plenty of good sand in Florida, although it is found in comparatively few localities, and the transportation charges make it a high-priced commodity in many places. With regard to coarse aggregate the condition is different.

Rock Varies in Quality

Rock that may be used and is used for certain purposes is distributed over a great part of the state, but while much of it will do for mass concrete work, where wearing quality is needed, as in concrete roads, its ability to stand up is still in question. At all events it is softer rock than is permitted by most highway departments.

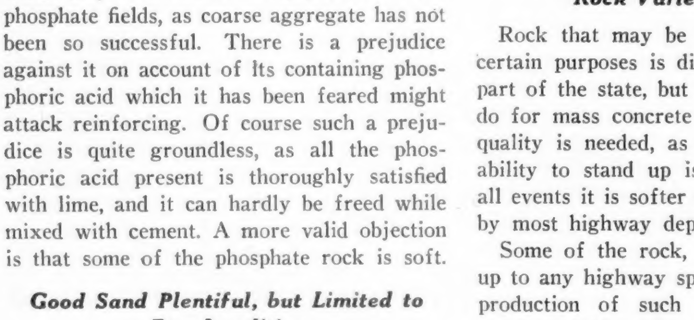
Some of the rock, however, would stand up to any highway specification. The oldest production of such rock is that of the crushed field stone and crushed flint and chert which is picked up as boulders lying in the fields in some of the western counties of the state. The flints are found in the upper part of the soft Ocala limestone and are picked out and crushed. The field stone, where it is not flint or chert, is an indurated form of the Ocala limestone, and the hardening has come about by weathering.

This field stone industry occupies a number of small plants, each of which produces two to three cars daily. Trucks bring in the stone from the field. Some of it is used for ruble masonry. Rock Products has published several articles on these small crushing plants, one of the latest being found in the issues for April 5 and May 3, 1924.

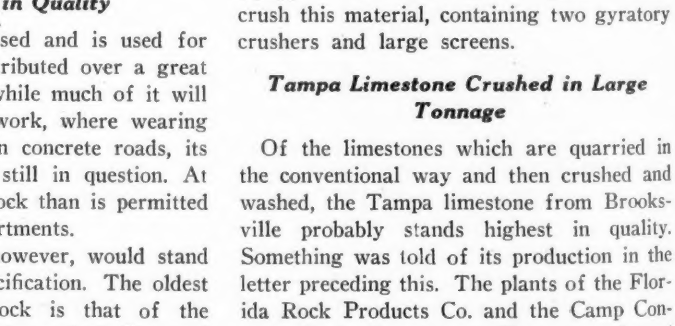
The Tampa Rock Co., in Tampa, has a plant for crushing this field stone and flint which is brought in by rail from Ocala and other points. It is much larger and better equipped than most of the plants which crush this material, containing two gyratory crushers and large screens.

Tampa Limestone Crushed in Large Tonnage

Of the limestones which are quarried in the conventional way and then crushed and washed, the Tampa limestone from Brooksville probably stands highest in quality. Something was told of its production in the letter preceding this. The plants of the Florida Rock Products Co. and the Camp Concrete Rock Co. are excellent examples of large tonnage crushing plants. The washing



Drying plant for limestone screenings, Ocean Stone and Gravel Co., Tampa



Plant for re-screening limestone screenings, yard of the Ocean Stone and Gravel Co., Tampa

system is effective, and the production is carried on by excellent organizations. For every purpose but making concrete roads it is unhesitatingly accepted, but on account of its low French coefficient, which runs from 6.3 to 7.0, it has not found favor where resistance to wear is required. However some satisfactory roads are reported to have been made of it and it ought to be thoroughly tested out for the purpose, as aggregate for concrete roads is so badly needed in Florida. It should be borne in mind that the conditions of wear in this state are not so severe as in northern states. Chains are very rarely used on automobiles and there is no snow and ice to form ruts in which the machines must travel, each cutting into the concrete with tire chains. The experiments of the Bureau of Public Roads showed that if chains were left off there was no discoverable wear on the concrete, so materials might be used for concrete roads in Florida which would not be acceptable in a northern state.

Roads of Sand-Mortar Top Given Trial

The use of a sand-mortar top on a base of concrete made with aggregate which is too soft to stand much wear is being tried out in other places. If it proves successful it may solve the problem of road aggregates in Florida, and in other places it may prove a boon to the producer who has an excess of sand to dispose of.

Ojus rock is not, as so many people have thought, a misspelling of "odius rock." The name comes from the town of Ojus in Dade county, not far from Miami. It is really an oolitic limestone (the Miami oolite), but in its deposition much fine sand was occluded, so that some of the state road department's tests have shown a silica content as high as 54.5%. This rock has been very extensively used as aggregate in buildings in Miami and other towns and as block aggregate. The two principal companies producing it are the Maule Ojus Rock Co. at Ojus and the Ojus Rock Co. with pits at Ojus and Naranja. The rock has undergone replacement, so in part it is a hard semi-crystalline limestone, but the hardness is not uniform. The Florida limestone report describes it as "a jagged, vesicular mass of hard replaced material with the voids and pits filled with softer material."

The quarry operations of the Maule company are most unusual as the rock is largely obtained below water. It is broken up with charges of dynamite and then dredged with a dipper dredge.

The hardened marls, coquina, and shell marls are quarried by a number of producers, none of whom produce large tonnages, although the total production is considerable. All of these have value as coarse aggregates and are used considerably.

Plant of Escambia Gravel Corp. at Tarzan, Fla.

Imported Aggregate Finds Favor

The most interesting thing about the imported aggregates is that some of them are brought in from long distances by water. Early last year, and in 1924, it was predicted that there would be a great amount of aggregate shipped to Florida by water from New York and other northern ports, but the business has developed to nothing like the extent that was expected. The harbors at Miami and other east coast cities were not sufficiently developed at that time to admit vessels of much draft and towing open barges around Cape Hatteras, one of the most dangerous points on the Atlantic Coast, did not appeal to those who studied the transportation problem. Some gravel bought from the Arundel Corp. of Baltimore was shipped to Miami by small vessels, but aggregate did not come in by water on the east coast in any large amount during 1925.

However, at Tampa and to some extent other points on the west coast, foreign aggregates have been received by water to a considerable extent. The Tampa Coal Co. has brought in a great deal of gravel from Mobile, where it is produced by the Mobile Gulf and Navigation Co. That which I saw being unloaded from a 5000-ton steamer was of excellent quality and the pebbles were from 1½ to 2 in. in size. It contained a few oyster shells, and two colored laborers picked these from the face of the pile as the bucket which brought the gravel from the hold was emptied.

Limestone and Screenings Brought From the North

At the yard of the Ocean Stone and Gravel Co. (which, like that of the Tampa Coal Co., is practically in the heart of the city), great piles of crushed limestone and limestone screenings were seen. These came from the quarries of the New York Trap Rock Corp. on the Hudson river. They are largely used for aggregate in the asphalt paving block which is so much used on the streets of Tampa and nearby roads.

The screenings have to be dried and rescreened to be used for this purpose, and a very neat little plant has been built for this. The dryer is an asphalt mixing cylinder externally fired. The dried screenings go to a belt conveyor that takes it to the screening plant which is in two sections. Vibrating screens are used and the dust from the operations is caught in a "cyclone." The screenings are separated on ⅛-in. screens and oversize and undersize and the dust are all saleable products.

This company also buys gravel from the Arundel Corp. of Baltimore and from the Newport Gravel Corp. of Newport News, Va. Distribution is mainly by truck and by barge, where jobs are situated on the water fronts of Tampa and St. Petersburg, so the railroad embargo does not affect the business.

The unloading arrangements at the yards of both companies mentioned are excellent. The Tampa Coal Co. uses a large stiff-leg derrick of structural steel. At the Ocean company's dock a well-designed steam-driven unloader is used consisting of a traveling crane, a hopper, and a belt conveyor. The conveyor could be turned to allow stockpiles to be built longer. A most efficient operator was handling it on the day it was visited, for the bucket made the round trip from the hold of the ship to the hopper and back in 20 seconds, and the pace was kept up for several minutes at least.

The Baker Sand and Gravel Co. ships a considerable quantity of gravel from Mobile to Tampa, where it is sold by the Tampa Sand and Shell Co. This gravel and that produced by the Mobile Gulf and Navigation Co. is produced nearly 100 miles north of Mobile in the Alabama and Tombigbee rivers, barged down to Mobile in 300-yd. flush-deck barges and loaded into steamers by floating cranes. It is quite a trip for just plain old gravel to take and it is something of an achievement to produce it and transport it so far and still be able to sell it at a reasonable price in Tampa and St. Petersburg.

The one place the writer found in Florida where aggregate was easy to get and of thoroughly satisfactory quality was Pensacola. The Flomaton gravel depostis are 40 miles north, the plants being at Tarzan, just on the Florida side of the state line. Two companies, the Escambia Gravel Co. and Edward Campbell, work these deposits which are of the stream-bed type and contain material of excellent quality.

Development of the Gyratory Crusher—II

Continuation of Series of Articles Begun in the January 23, 1926, Issue — Special Types of Gyratory Crushers and Special Features of Various Manufacturers' Makes of Gyratory Crushers

By Hugo W. Weimer
Consulting Engineer, Milwaukee, Wis.

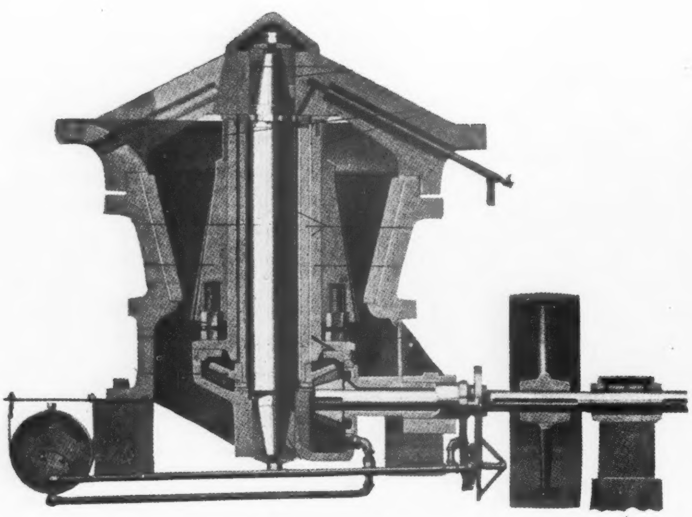


Fig. 3—Early design of the Symons or Telsmith type of gyratory crusher

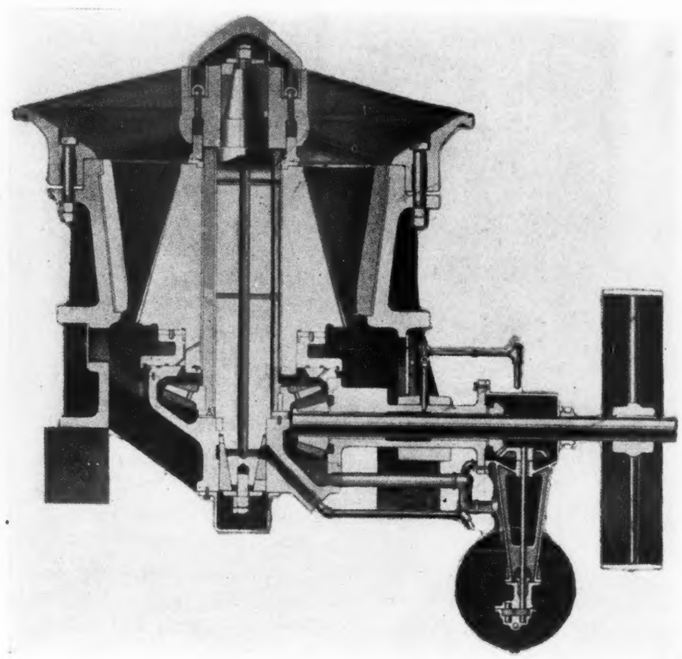


Fig. 1—Present Telsmith type of primary crusher

The development of first short shaft gyratory crusher and of a pioneer reduction crusher

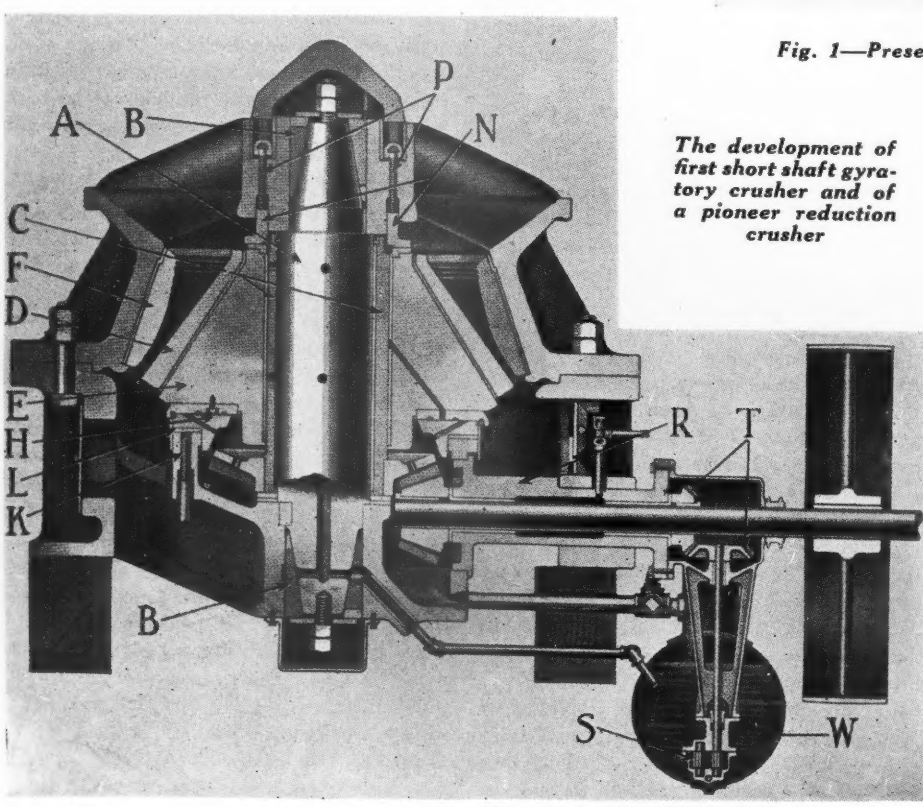


Fig. 2—Present Telsmith type of reduction crusher

IT IS very interesting to record the advance in design and construction of the gyratory type of crusher as accomplished by the various manufacturers. The purpose of this article is to bring to the attention of the reader the numerous makes of gyratory crushers and illustrate and describe briefly the principal points of interest, and show whenever possible the old and new types.

In the first article two makes were discussed, and with the information contained herein it is the hope of the writer that the operators will derive some benefit from this brief outline of gyratory crushers in general. It is manifestly impossible to do full justice to all details of construction of all makes, but certainly this discussion should be of mutual benefit to operators and manufacturers alike. Each year marks some advance in design, and while the gyratory principle is an old one, it is by no means losing its popularity, as evidenced by its widespread use today.

Telsmith Parallel Motion Gyratory Crusher

The appearance of the crushing bowl in this design is similar to the gyratory dis-

cussed in the first article, but as the main shaft is fixed or stationary with the moving eccentric fitted between the head and shaft, the motion is parallel, producing a uniform stroke at all points between the head and concaves. Two styles are built, one used as a primary crusher and the other as a secondary or reduction crusher. The first mentioned is illustrated in Fig. 1 and the second in Fig. 2.

Placing the eccentric between the head and shaft makes it possible to use a very short main shaft. A geared oil pump is attached to provide positive and continuous lubrication to the eccentric bearing and the drive gears. The first crusher of this design was built about 20 years ago; the present improved type is the result of the experience gained during this period.

The design of the reduction crusher is such that the discharge area is greater in proportion to the feed opening than in the primary crusher, which is a very desirable feature for fine crushing. The primary crusher is made in seven sizes, ranging from 6¾ to 25-in. opening between the head and concaves at the top. The discharge openings and rated capacities vary from 1 in. at 12 tons per hour to 4 in. at 325 tons per hour. The reduction crusher is built in three sizes, taking 4-in., 6-in., and 8-in. cube sizes, respectively. The discharge openings and capacities vary from ⅝-in. at 10 tons per hour to 1½-in. at 90 tons per hour.

This crusher was the forerunner of the present-day short shaft gyratory crushers and met a popular demand. Fig. 3 illustrates an earlier design, and a comparison with the type of today shows a number of marked improvements, again illustrating that the manufacturers are ever on the alert to produce better and more efficient equipment. The reduction crusher, Fig. 2, was the leader of the present-day fine crushers of the gyratory type.

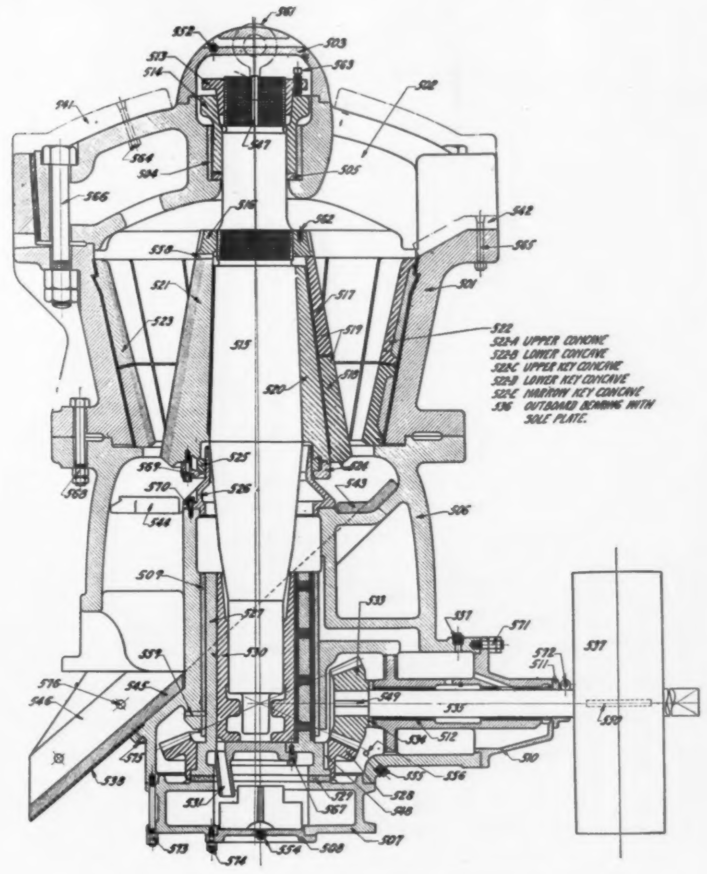


Fig. 5—The Traylor or "Bulldog" type of gyratory crusher of today

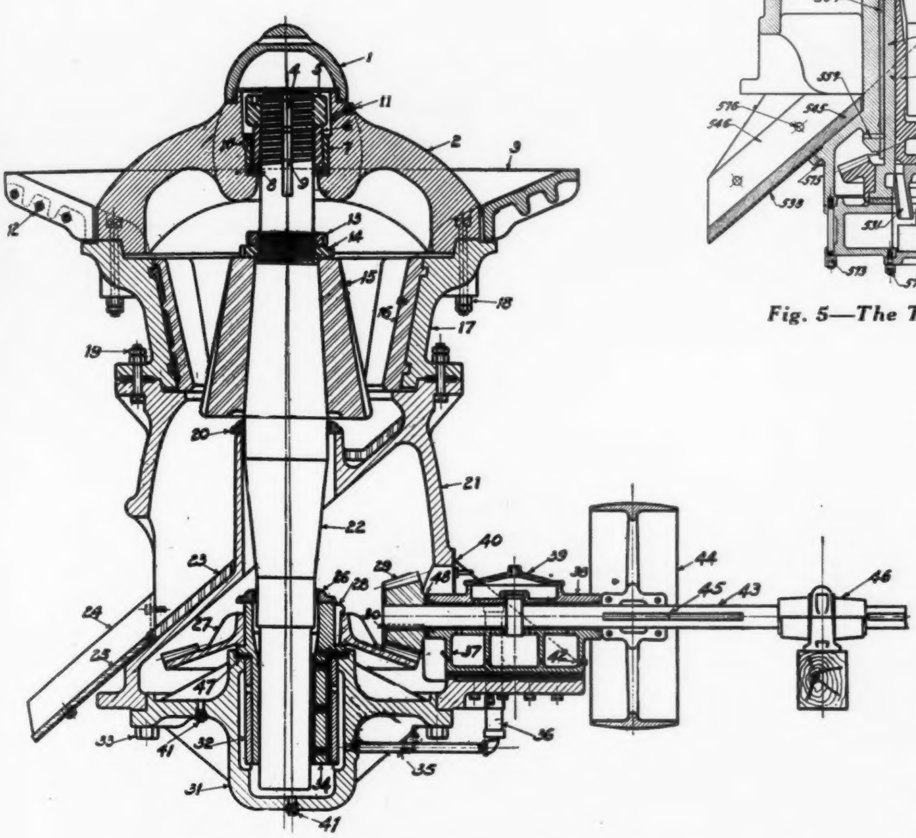


Fig. 4—The Traylor gyratory crusher of about 20 years ago

Traylor Bulldog Gyratory Crushers

This make of crusher has the shaft pivoted above and the eccentric placed below the head. Fig. 4 shows the design of 20 years ago and Fig. 5 the design of today. There are many features worthy of mention in the present type "T" crusher, such as the bar-type spider which consists of a cross member only fitted into pockets in the top shell, the self-tightening shaft suspension nut, the sleeve arrangement at the lower end of the shaft, and the novel force feed lubricating system. A revolving scoop placed below the eccentric picks up the oil from the chamber below and through centrifugal action the oil is carried upward by spiral grooves between the outer face of the lower shaft sleeve and the inner face of the eccentric casting.

The type "T" crusher is built in 13 various sizes ranging from 2½-in. to 72-in. openings. A line of reduction or finishing crushers are also made in this design and are furnished in four different sizes with 4½-in., 6-in., 10-in., and 20-in. openings.

Austin Gyratory Crushers

These are also of the original gyratory type and Fig. 6 illustrates the earlier design with supported shaft, and Fig. 7 the present construction with suspended shaft. Several details of design are different from the others illustrated, one feature being the double countershaft bearings have a bearing placed on either side of the driving pinion, thus having no overhanging pinion. Fig. 8 illustrates the novel lubricating arrangement. The gyratory action of the main shaft is utilized to operate a piston type pump which draws the oil from the reservoir in the bottom plate and delivers it to the top of the eccentric, thus providing a circulation

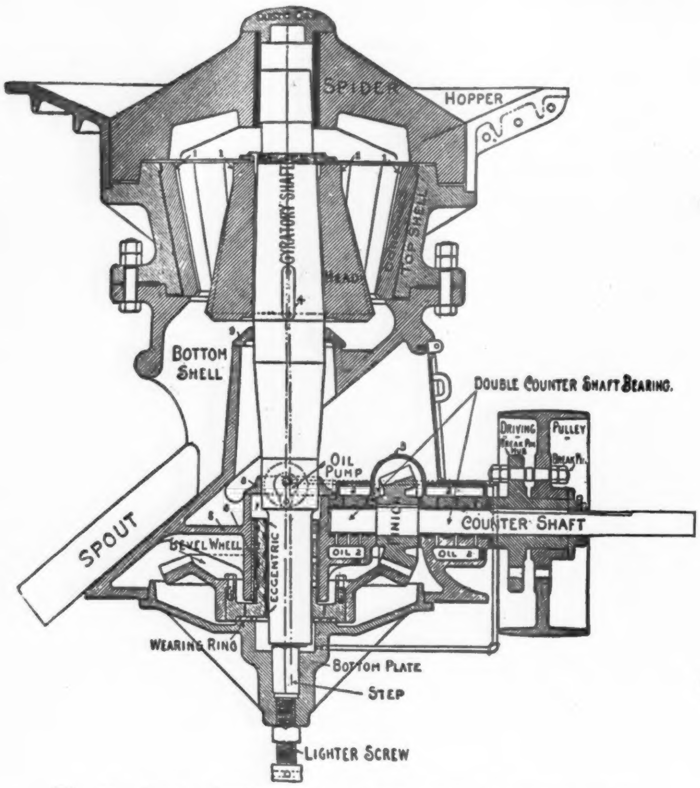


Fig. 6—Early design of the Austin crusher—one of the early Gates type of gyratory crushers

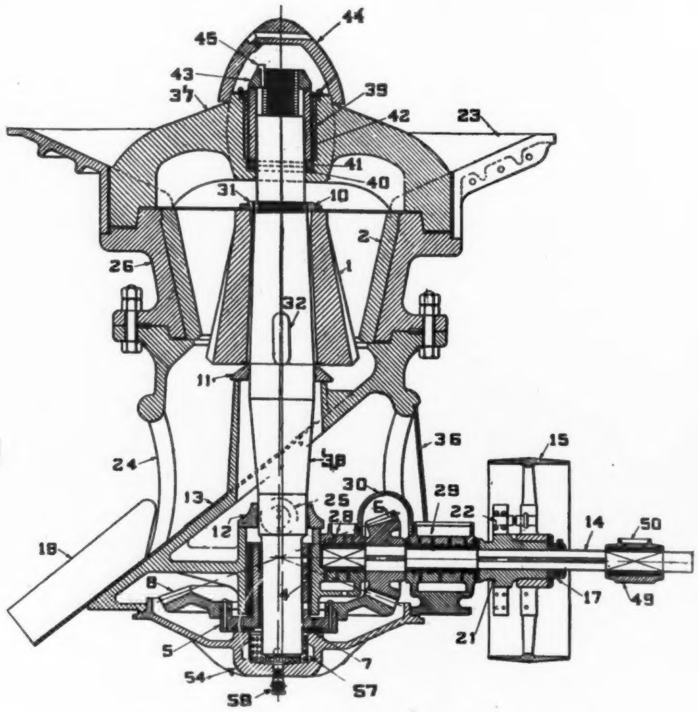


Fig. 7—Present construction of the Austin gyratory crusher

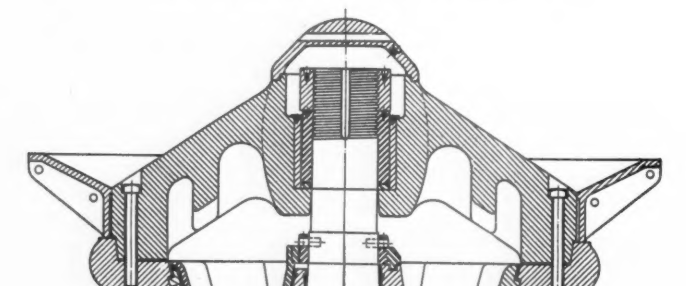


Fig. 9—Construction of the Kennedy gearless type of gyratory crusher

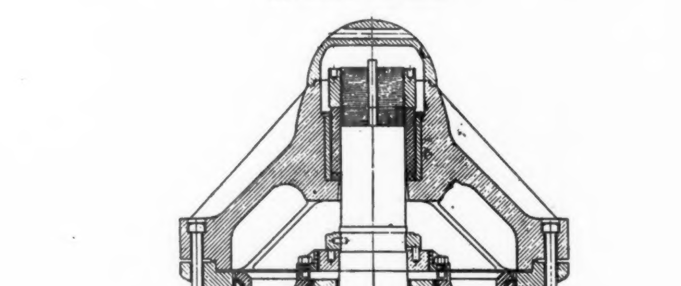


Fig. 10—Kennedy reduction crusher with attached electric motor drive

of lubricant. These crushers are made in seven sizes from 8-in. to 19-in. opening, and in addition a line of "Super" crushers are built in three sizes for fine crushing.

Kennedy Gearless Gyratory Crushers

As explained in the first article the speed or number of gyrations has a direct relation to the capacity of a gyratory crusher, thus when Kennedy eliminated the bevel gear arrangement for driving by practically belting direct to the eccentric, it was possible to increase the crushing speed. Fig. 9 illustrates the construction used to obtain a gearless crusher. The drive pulley is connected to the eccentric by means of a flexible coupling. A ball and socket eccentric is also a novel feature. The geared type oil pump driven from the main pulley provides the necessary lubrication. Fig. 10 shows the motor-driven gearless crusher with the motor built inside of the crusher pulley. In addition to the gearless crusher Kennedy also has a line of standard, geared-type, gyratory crushers.

Weston Gyratory Crusher

It will be noticed that under the classification of gyratory crushers with the shaft pivoted above and the eccentric placed below the head, giving the greater motion at the bottom of the crushing bowl and the lesser at the top, can be listed such makes as Traylor, McCully, Austin, Gates, and Kennedy. With the parallel crushing stroke only one can be classified and that is the Telsmith. At the present time only one type of crusher with the eccentric above the head is being manufactured and that is the Weston direct-

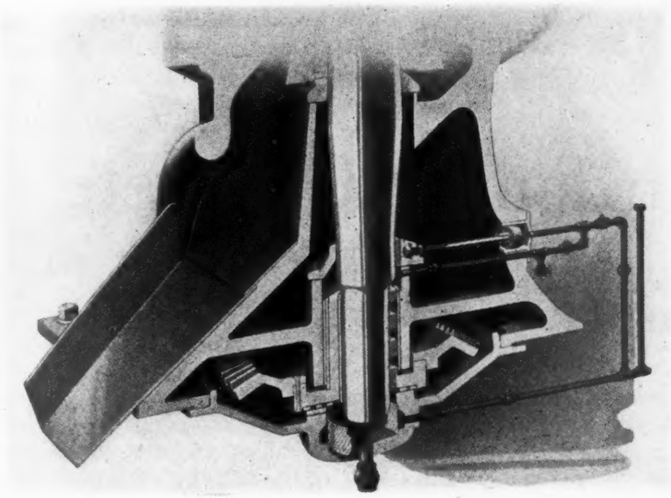


Fig. 8—Novel lubricating mechanism of the Austin type of gyratory crusher

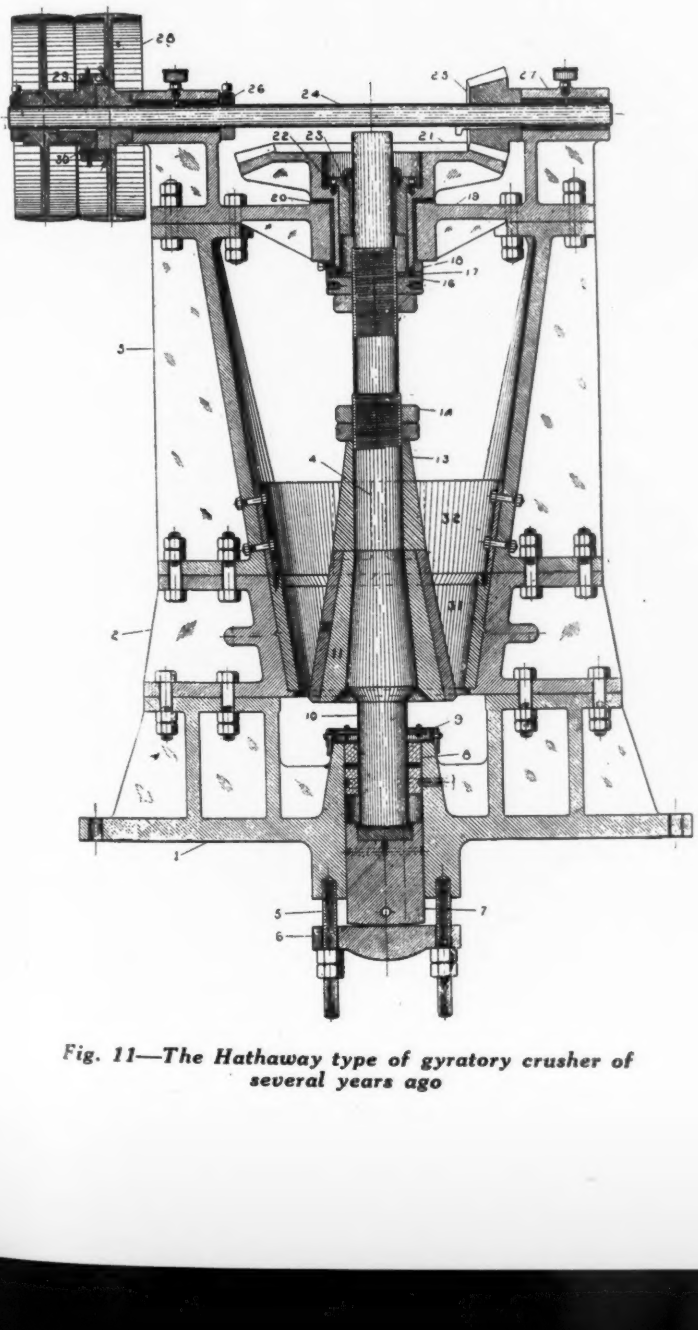


Fig. 11—The Hathaway type of gyratory crusher of several years ago

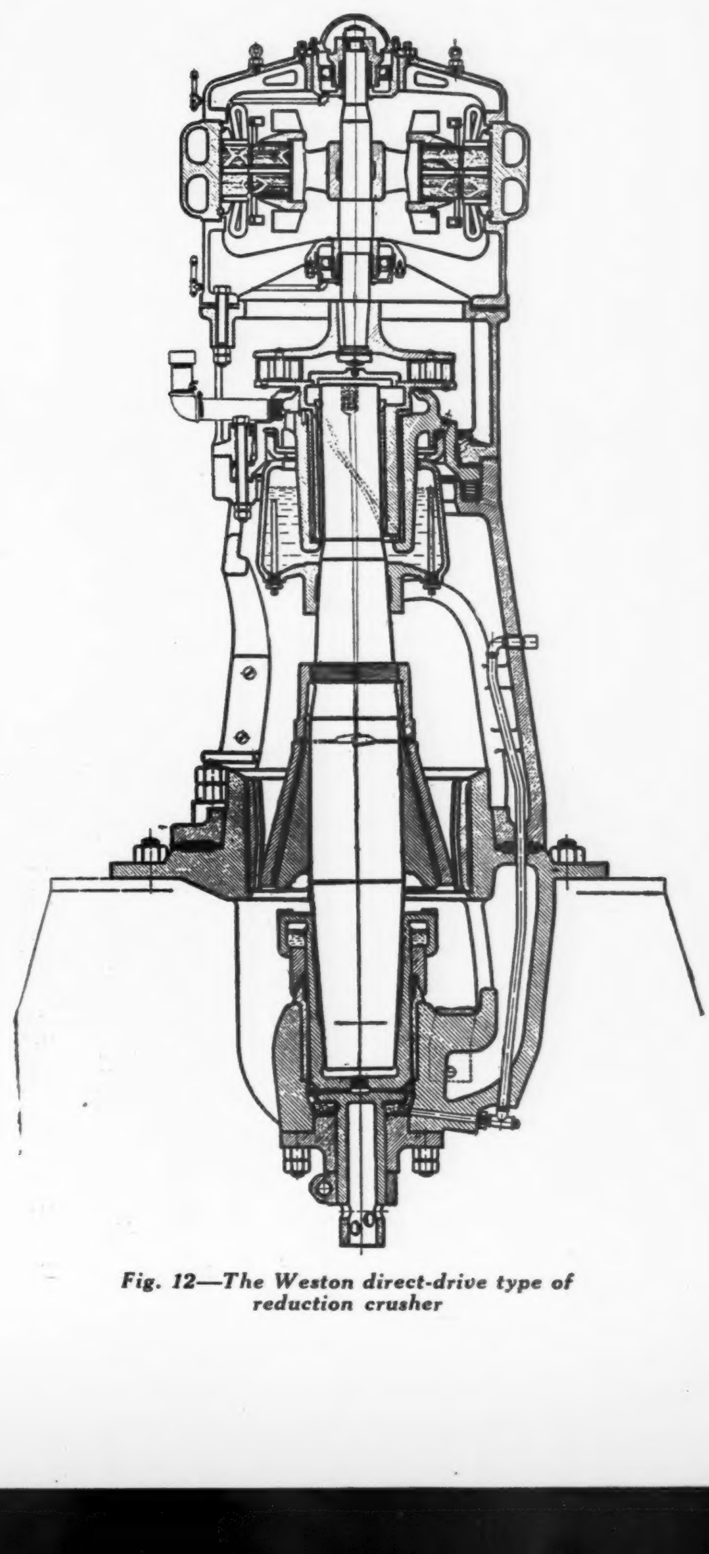


Fig. 12—The Weston direct-drive type of reduction crusher

drive crusher as shown in Fig. 12. This is a finishing crusher only, having the greatest motion at the top and the least at the bottom. Fig. 11 illustrates an old design of this type of crusher, the almost forgotten "Hathaway" crusher, with a bevel gear drive placed at the top.

Other Types of Gyratories

In the preceding article gyratory crushers of one type only were discussed, being the design with the shaft pivoted above the head and with the eccentric, which gives the motion below the head. They can be used equally as well for primary or secondary crushing. For the first break other types can also be applied, such as the parallel motion gyratory, jaw type, and in some cases the single slugger roll type and the hammer type. For secondary crushing all the types mentioned except the single slugger roll type are also applicable, and in addition the disc type, double-roll type, and the gyratory with the eccentric placed above the head, giving the greater motion at the top of the crusher bowl.

To illustrate the various principles of crushing as performed by the types mentioned is the purpose of this article. It is manifestly impossible to do full justice to all details of design and to illustrate all the variations as produced by different manufacturers, but the types, not including the ones already discussed, may be roughly classified as follows:

Single-roll slugger type, hammer type, jaw type with greatest motion at bottom, jaw type with greatest motion at top, disc type, double-roll type.

California Quick Hardening Concrete*

Highway Research Department Finds Mixtures That Will Allow Roads to Be Opened in Two to Three Days

STATE Highway Engineer R. M. Morton directed the research department, some months ago, to endeavor to develop a quick hardening concrete for emergency use on state highways. A product was desired which would be reasonable in price and which could be safely opened to traffic in a comparatively short time after placing. The results of experimental work at the laboratory indicate such a concrete can be had at a slight increase in cost over standard mixtures. Concretes were developed which, under favorable conditions, will withstand traffic in 24 to 48 hours.

In any test series a considerable number of individual test specimens are desirable, if averages are to be accepted as reliable. It was, therefore, necessary to confine this test series for quick hardening concrete to two brands of portland cement and one brand of high alumina cement. The portland cements selected were Santa Cruz, a standard commercial cement produced in northern California, and Victor Oil Well cement, a southern California product. These two cements were chosen because they gave highest seven-day compressive strengths in 1-3 mortar with Standard Ottawa sand.

The early and ultimate strengths of various brands of cement vary from time to time. The selection for this series of tests was made about one year ago on the showing of seven-day strengths at that time, and should not now be followed without further tests to determine present relative strengths.

For use in quick hardening, the available brands should be tested at seven days, preferably in 1-2 mortar with and without calcium chloride as an admixture. The brand which shows the highest early strength should be chosen for use in quick hardening concrete. This practice of selecting a cement because of high seven-day strength would not be desirable in ordinary work, because high early strength does not necessarily indicate high ultimate strength. In this work, early strength is the primary consideration. All of the quick hardening mixes will be richer than usual and will have sufficient ultimate strength.

The suggested tests also will show whether calcium chloride should be added. Some of our cements show little, if any, beneficial effects from the use of this chemical; others show appreciably higher early strengths. Lumnite cement was included in the series as a representative of the new type of high alumina cement now being introduced on the market.

Mixtures were made up with each brand using six, seven, and eight sacks per cubic yard of concrete. The specimens were 6x6x12-in. prisms. Natomas gravel and Livermore sand were used in all tests.

In the preparation of these specimens, no refinement was practiced not obtainable in

*C. L. McKesson, Materials and Research Engineer, California Highway Department, in *California Highways*.

TABLE I.—QUICK HARDENING CONCRETE

Table Showing Individual Breaks—Specimens 6"x6"x12".

Mixture	Batch No.	24-hour strength	48-hour strength	3-day strength	7-day strength	28-day strength
1. 6 sack Victor Oil Well without Cal. Chloride (1-1¾-3½ mix).	1	800	1580	....	3091	4362
		....	1720	....	3286	5105
	2	....	1730	2350	3377	4475
	3	795	1600	....	3100	....
		....	1720	....	2930	4516
Average	....	797	1672	2350	3157	4615
2. 6 sack Santa Cruz without Cal. Chloride (1-1¾-3½ mix).	19	1061	1978	....	2855	4124
		....	1827	....	3072	4428
	20	....	1869	2186	2913	4530
		....	....	....	2903	4358
	21	841	1416	....	2416	4250
		....	1522	....	....	....
Average	....	951	1722	....	2832	4338
3. 6 sack Victor Oil Well with 2% Cal. Chloride (1-1¾-3½ mix).	7	1270	1840	....	2841	4167
		....	1950	....	3061	4167
	8	....	1860	2328	3011	3841
		....	....	....	3105	4075
	9	1440	2200	....	3086	4300
		....	2140	....	....	....
Average	....	1355	1998	....	3021	4110
4. 6 sack Santa Cruz with 2% Cal. Chloride (1-1¾-3½ mix).	4	1635	2240	....	3569	4105
		....	1940	....	3616	....
	5	....	2370	2440	3286	4302
		....	....	....	3225	4180
	6	1585	1950	....	3292	4155
		....	2090	....	....	....
Average	....	1610	2118	....	3398	4185
5. 7 sack Victor Oil Well, with 2% Cal. Chloride (1-1½-3 mix).	13	2190	3000	....	4025	4700
		....	2855	....	3822	5236
	14	1870	2511	....	3586	4405
		....	....	....	3808	4742
	15	....	3006	....	....	....
		....	2678	3160	4333	4783
Average	....	2030	2810	....	3913	4774
6. 7 sack Santa Cruz with 2% Cal. Chloride (1-1½-3 mix).	10	2030	3030	....	3961	5000
		....	2880	....	4016	4861
	11	....	2750	3122	3900	4883
		....	....	....	4097	4397
	12	2010	2730	....	....	....
		....	2910	....	3722	4617
Average	....	2020	2860	....	3939	4751
7. 8 sack Santa Cruz cement with 2% Cal. Chloride (1-1-3 mix).	16	2470	2847	....	3894	4519
		....	3017	....	3844	4656
	17	2530	2878	....	4344	....
		....	....	....	3833	4725
	18	....	2742	....	....	....
		....	2997	3360	3917	5086
Average	....	2500	2896	....	3966	4746
8. 7 sack Santa Cruz without Cal. Chloride (1-1½-3 mix).	22	1219	1800	....	2941	4530
		....	2094	....	3219	5122
	23	....	2150	2847	3475	5120
		....	....	....	3267	4472
	24	1078	1819	....	....	....
		....	2000	....	2947	5222
Average	...	1148	1973	....	3169	4893

the field. The usual A. S. T. M. method of laboratory preparation of concrete consists of grading material separately for each specimen and of mixing each specimen in a separate batch. This was abandoned in this series because such methods could not be followed in the field. Concrete was mixed with a shovel on a platform in batches of six specimens each. The only refinement was in grading aggregate in two sizes, 40% passing 2 in. and retained on 1 in. and 60% passing 1 in. and retained on ¼ in. This could be done in the field and would undoubtedly result in greater uniformity in concrete. Water was accurately measured, but concrete was sufficiently wet for field use, slump 1⅛-to 1½-in.

The results of these tests are shown in Table 1 and graphically in Figure 1.

It will be noted calcium chloride materially increased the early strength of the concrete and that there is no difficulty involved in its use. It should be added to mixing water in the proportion of 2 lb. of flake calcium chloride to each sack of cement, or, if liquid calcium chloride is used, it should be on the basis of 1½ lb. of anhydrous calcium chloride per sack of cement. Professor Abrams, in Bulletin No. 13, shows that there is no retrogression in concrete due to this small amount of calcium chloride.

In this test series it was found that 2000 lb. compressive strength could be obtained in 24 hours using a seven-sack (1-1½-3) mix. Much concrete pavement has been opened to traffic in 21 days with a lower strength. After 48 hours, the strength of this mixture was 2800 lb.

Eight sacks per cubic yard (1-1-3) with calcium chloride, gave a somewhat higher strength in 24 hours, but the advantage was almost lost at 48 hours.

It is believed that the seven-sack mixes used in this test may be opened for use in 48 hours provided following conditions are carefully observed:

1. Use good coarse concrete sand.
2. Use well graded gravel or crushed stone.
3. Use a reputable brand of cement which shows high seven-day strength.
4. Use about six gallons of water per sack of cement.
5. Weigh or measure water for each batch and add one pound fourteen ounces (avoirdupois) calcium chloride crystals per sack of cement.
6. Mix thoroughly, place on wet subgrade and keep wet and protected for 48 hours.
7. Earth curing, paper covering or calcium chloride surface application would insure some further curing even after pavement had been opened to traffic.

The specimens for the test of high alumina cement concrete consisted of twenty-five specimens 6x6x12 in. The cement was obtained from the Atlas Lumnite Cement Co. of New York. Livermore sand and Natomas gravel were used as in preceding tests. Grading and methods of manipulation were as described for portland cement concrete.

Specimens marked B-25, B-26, and B-27 were from batches 25, 26, and 27, respectively. Each batch contained concrete for six specimens, was mixed by hand, and proportioned as follows:

7,000 grams water
15,096 grams Lumnite cement
29,808 grams fine aggregate
62,595 grams coarse aggregate
Slump 1½ in.

The mix was approximately 1-1.75-3.5 (loose measure) and yield was on basis of six sacks of cement per cubic yard of concrete in place.

Specimens marked B-28 were from a nine-specimen batch, with following proportions:

11,000 grams water
27,072 grams Lumnite cement
44,712 grams fine aggregate
93,892 grams coarse aggregate
Slump 1½ in.

This mix was approximately 1-1½-3 (loose measure) and yield was on basis of seven sacks per cubic yard.

The strengths obtained are shown in the following tabulation. (See Table 2.)

The total number of specimens was too small to give specimens for average values at all ages. At the time the tests were made, this cement was not on sale on this coast and the material for these tests was obtained by express, hence a limited quantity was available. More recent tests, however, indicate that these tests are typical of results to be expected of this unusual cement and the following may be stated as tentative conclusions:

Reference numerals on curves indicate mixtures as follows:

No. 1. Victor cement—1—1¾—3½ mix (6 sack); no admixture.
2. Santa Cruz cement—1—1¾—3½ mix (6 sack); no admixture.
3. Victor cement—1—1¾—3½ mix (6 sack); 2% $CaCl_2$.
4. Santa Cruz cement—1—1¾—3½ mix (6 sack); 2% $CaCl_2$.
5. Victor cement—1—1½—3 mix (7 sack); 2% $CaCl_2$.
6. Santa Cruz cement—1—1½—3 mix (7 sack); 2% $CaCl_2$.
7. Santa Cruz cement—1—1—3 mix (8 sack); 2% $CaCl_2$.

1. Strengths of 5000 lb. per square inch may be obtained in twenty-four hours without curing, using the normal amount of cement (6 sacks per cubic yard).

2. There is apparently little to be gained by using a richer mix.

3. The tests indicate no increase of strength is to be expected in 28 days. (The tests apparently show a slight retrogression.)

4. The series previously reported with tests included herein, make the following strength-cost comparisons possible.

This comparison suggests the use of Lumnite cement only where a very high early strength is imperative. Seven sacks of Santa Cruz with $CaCl_2$ gives a 2000-lb. concrete in 24 hours, 2800-lb. in two days, and a very high 28-day strength at a cost of only 16c per square yard more than ordinary concrete, and for $1.24 less per square yard than with Lumnite cement. Such concrete might be opened to traffic in two or three days and with the low additional cost of 16c per square yard for six-inch pavement (or 19c for 7-in. pavement) might be economical for use on paving projects and in structures, as well as in patching.

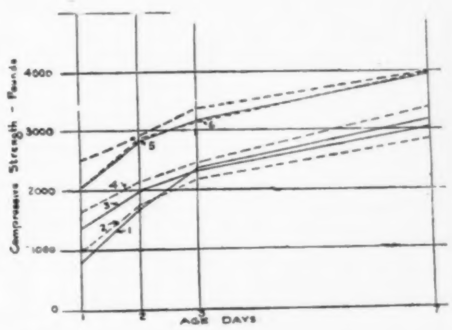


Fig. 1. Graph showing strength increase from one to seven days

Lumnite cement is now carried in stock on this coast and the very high strength developed in the first 24 hours will doubtless render it if great value where high strength concrete is required and immediate use is of prime importance.

TABLE II

COMPRESSIVE STRENGTH OF CONCRETE MADE WITH LUMNITE CEMENT

Batch No.	6 sack cu. yd. 1 day	2 day	4 day	7 day	28 day	90 day	7 sack cu. yd. 1 day	2 day	28 day
25	......	6050	5330	5020	5960	......	......	......	......
	......	6040	......	......	......	......	......	......	......
26	5360	5600	5240	5770	5340	......	......	......	......
	......	5780	......	......	......	......	......	......	......
27	......	5840	......	5220	6090	5320	......	......	......
	......	......	......	......	......	5330	......	......	......
28	......	......	......	......	......	......	5060	5790	5680
	......	......	......	......	......	......	......	6410	6790
	......	......	......	......	......	......	......	5950	5350
	......	......	......	......	......	......	......	5970	......
	......	......	......	......	......	......	......	6030	......
Average	5360	5862	5285	5336	5796	5325	5060	6030	5940

TABLE III

COMPARISON OF VARIOUS QUICK HARDENING CONCRETES

Brand	Sacks cu. yd.	Compressive strength 24 hour	48 hour	28 day	Cost cement (and $CaCl_2$) per cy. conc.	Cost cement per sq. yd. 6" pave.
Lumnite	6	5360	5862	5796	12.75	2.12
Santa Cruz	*7	2020	2860	4751	5.15	.86
Victor Oil Well	*7	2030	2810	4774	8.54	1.42
Santa Cruz	*8	2500	2895	4746	5.88	.98
Santa Cruz	**6	951	1722	4338	4.17	.70

*With 2% $CaCl_2$ admixture.
**Ordinary specification paving mix without $CaCl_2$.

Assumed prices Cement Lumnite..........$8.50 bbl. Net f.o.b. Sacramento
Assumed prices Santa Cruz cement.......... 2.78 bbl. Net f.o.b. Sacramento
Assumed prices Victor Oil Well cement.. 4.72 bbl. Net f.o.b. Los Angeles
Assumed prices $CaCl_2$..........40.00 ton Net f.o.b. Sacramento

Universal Gypsum Co.'s Newest Mill

Three Kettle Operation Producing 9,000 Tons of Calcined Product per Month at Rotan, Texas

By W. H. Crutchfield
Chief Engineer, Universal Gypsum Co.

THE plaster mill at Rotan, Texas, was completed and started operations in July, 1924. It is the most recent and modern plaster mill of the Universal Gypsum Co. The company has extensive holdings at Rotan, and the gypsite beds are said to be practically the best in the Southwest district. The gypsite beds are continuous over large areas and vary in depth from 6 to 13 ft.

General Description

The entire plant at Rotan is located on gypsite deposits, therefore the present digging operations are located in close proximity to the calcining mill. The "dirt" as excavated is loaded by a Marion Model 21 gas-electric shovel into 4-yd. side-dumping cars and hauled from the "pit" to the gypsite bin by a Whitcomb Model MO-6 6-ton gasoline locomotive.

Loading gypsite at the Rotan plant of the Universal Gypsum Co.

The gypsite bin, which is nothing more than a hopper, is located along the haulage tracks between the dirt shed and the calcining mill. The material is moved from the bin by drag chains, feeding directly into a swing hammer crusher. This breaks up all of the lumps and clods, and produces a fairly uniform product. From the crusher the material is carried on a 24-in. inclined belt conveyor to the dirt elevator. The material is elevated to a sufficient height to spout direct to each of the kettles, eliminating bins for storing the raw product which are not practical owing to the peculiar properties of raw gypsite (it tends to pack).

This arrangement is possible through the use of a swinging spout, attached to the delivery head of the elevator. If the dirt is not to be fed to the kettles, it is by-passed by a spout to a 24-in. conveyor belt running


View of Rotan mill looking north. Boiler house and board plant at right, plaster mill in center, and "dirt" shed at the left. The "dirt" haulage tracks and equipment appear in the foreground

at 240 ft. per minute, which carries the material to the dirt storage shed. This conveyor is installed on a bridge which is part of the structure of the dirt shed.

The capacity of the dirt storage shed for material fully protected from the weather is approximately 3000 tons. This is equivalent to about 10 days' run of the calcining mill. This reserve supply is necessary during the rainy season, as it is practically impossible without considerable expense to dry gypsite as taken from the "pit" in a wet condition.

The recovery of the material from the dirt shed is accomplished by means of a drag chain installed in a concrete tunnel below the pile. Owing to its peculiar properties, reciprocating or other type feeder gates are not used, but the top of the tunnel is covered with heavy planks, laid across the walls of the tunnel, but not fastened, and the operator when the drag chain is to be used starts removing these planks at one end of the pile and allows the "dirt" to feed onto the chain.

This recovery drag feeds the inclined belt mentioned before, which in turn feeds the dirt elevator.

Three 12-ft. Ehrsam kettles are utilized for calcination, the fourth kettle being installed at the present time. These kettles are fired with oil, approximately 10 gal. of oil being used per ton of gypsite. As the kettle must not only drive off the water of crystallization but also take care of the surface moisture, the average time of calcination is 5 hours for 20 tons of material.

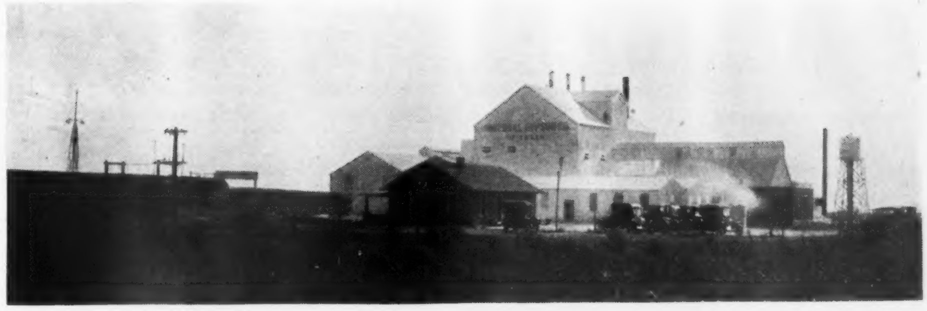
The total prodnction of the mill at the present time is 9000 tons of calcined product per month, with the addition of the fourth kettle the production will advance to 12,000 tons per month.

Each kettle is provided with a steel dust bin suspended below the roof at the ridge. These bins are provided with conveyors for returning the material collected to the kettles.

The hot pit is installed adjacent to the kettles. Four pit emptiers of the screw type are utilized for conveying the hot stucco to a 12-in. screw conveyor. This conveyor in turn feeds the hot pit elevator which elevates the stucco to the two Hum-mer screens on the third floor. A system of conveyors is used to return stucco, not properly calcined due to premature dumping of the kettles, to the dirt elevator, from whence it is again fed to the kettles.

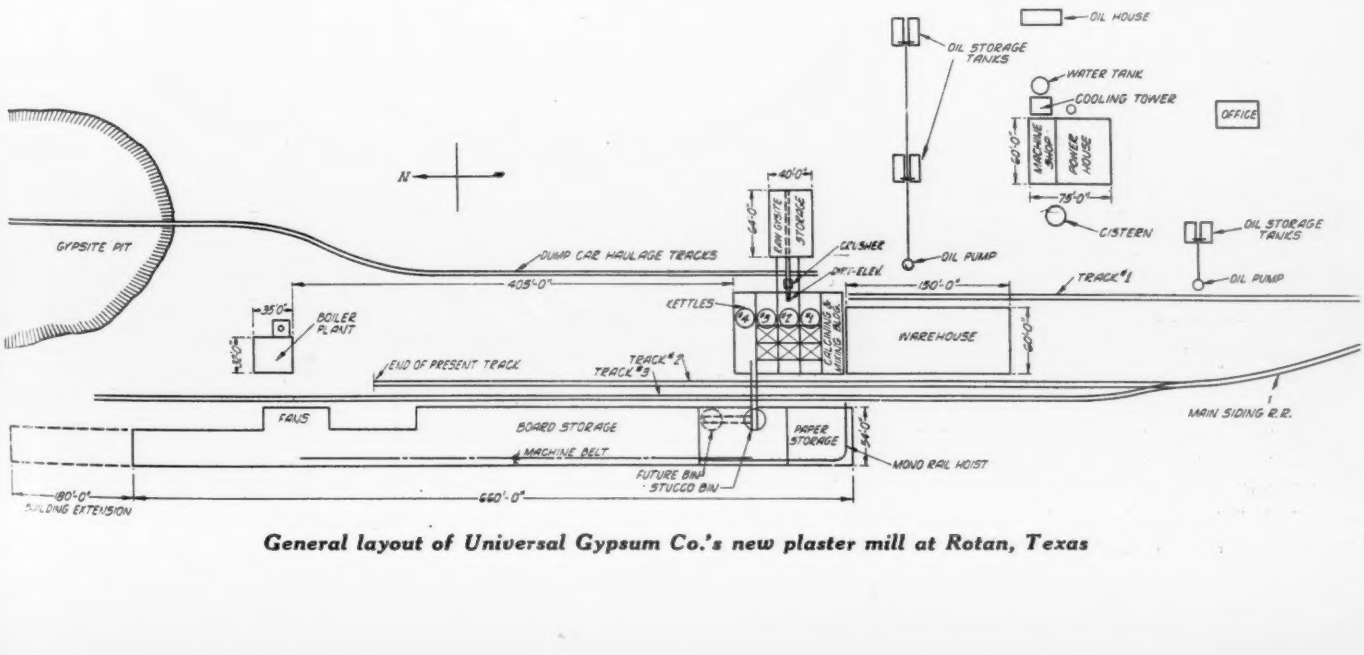
The tailings from the screens are put through a small roll crusher broken down and put over a scalping scren for separating roots, tramp iron and other foreign substances. The stucco is there passed to a burr mill.

The stucco from the screens is conveyed



Rotan plant, looking south. Machine shop and "dirt" shed at right, calcining mill in center, and paper storage end of board mill at left

Calcining kettles, showing air and oil piping and oil burners



General layout of Universal Gypsum Co.'s new plaster mill at Rotan, Texas

for distribution to three 100-ton steel storage bins. Here the stucco is allowed to lose its initial heat. From these bins the stucco is conveyed to an elevator that distributes, through conveyors, the material to three other 100-ton bins and also feeds the conveyor to the board plant. These last mentioned bins are located above the one 1-ton and two ½-ton mixers and Bates sackers. These mixers handle the various grades of plaster manufactured, as well as the new product, Insulex. Raw material used in connection with the stucco is elevated from the warehouse, located at the north end of the mill building, to the mixer charging floor, which is the second floor of the mill building.

The sacked material is loaded out to cars from the mixer floor which is on the same level as the car floor.

Electric Drive Used Throughout

The entire mill is electrically driven. Separate drives are used as much as possible for the different operations. Forty horsepower slip-ring motors used on the kettle agitator drive, are the largest size motors used in the plant; all others range in smaller sizes.

All the buildings are of steel construction, with corrugated steel roofing and siding, and reinforced concrete floors. The plaster mill has three floors and covers a ground area of 74x100 ft. All of the buildings are grouped in close proximity to each other, but at the same time laid out in reference to each other to decrease fire hazards. The layout of the entire mill is as shown on layout included with this article.

National Gypsum Company Enters Wall Board Field

ACCORDING to a recent announcement in the San Francisco, Calif., *Pacific Builder,* the National Gypsum Co. of Buffalo, N. Y., has completed plans for the erection of a large wall board plant at Clarence, N. Y., for the manufacture of an improved gypsum wallboard. The company is said to have acquired extensive gypsum deposits in the locality which on tests by the Babcock Testing Co. are said to show a gypsum of purer and better quality than has previously come from that field. The average purity of the gypsum taken from the properties of the National Gypsum Co. is given at 98.16%, while the best grades in the Eastern field are said not to exceed 93%.

Approximately 9,000,000 tons of this gypsum is said to have already been proven on the holdings of the National Gypsum Co., the value of which has been set by the American Appraisals Co. at $1,077,000.

It is estimated that the gypsum deposits of the company will supply its giant plant now under construction, for a long period.

Two innovations are already announced by the National Gypsum Co. First, the company is building its plant which is said to be the largest single wall board unit in the world, on the site of its gypsum deposits, thus bringing complete wall board manufacture from mine to freight car together in one location. Economies of freight and handling have been anticipated with this new method.

The second innovation is the introduction of a new gypsum wall board said to be tougher than is afforded by the market at the present time and at the same time much lighter in weight, according to the manufacturers.

These two features, it is anticipated, will give the production of the National Gypsum Co. an immediate reception on the market.

The plants of the company at Clarence, N. Y., are already under construction and it is expected will be in production on April 1.

While it is understood that much of the distribution of the new product has been arranged for, the names of distribution agents throughout the country have not been announced. The trade name of the new product is to be announced on March 1.

The company was organized under the laws of Delaware on August 29, 1925. The authorized capitalization is $2,500,000.

The officers of the company are all men who have been connected with the industry in all its phases for years.

J. F. Haggerty, president of the company, has a wide experience. For eight years he was in charge of the sales development department of the Sherwin-Williams Co., for 11 years vice-president of the Beaver Board Co. in charge of sale and production of fibre and plaster wall board and for two years secretary of the Universal Gypsum Co. and president and general manager of the Gypsolite Co., the subsidiary of the Universal company, handling production and sale of plaster wall board.

C. E. Williams was for eight years with the United States Gypsum Co., for five years vice-president and general manager of the Crown Gypsum Co. of Toronto, Ont., for five years general production manager of the American Cement Plaster Co. and for three years vice-president in charge of production at the Universal Gypsum Co.

Associated with Mr. Haggerty and Mr. Williams in the enterprise are J. W. Waldron, former chief engineer of the Universal Gypsum Co., and J. J. Turner, former engineer for the Best Wall Manufacturing Co. They will handle the engineering features of the new corporations.

Virginia-Carolina Chemical Co. Makes Montgomery Headquarters

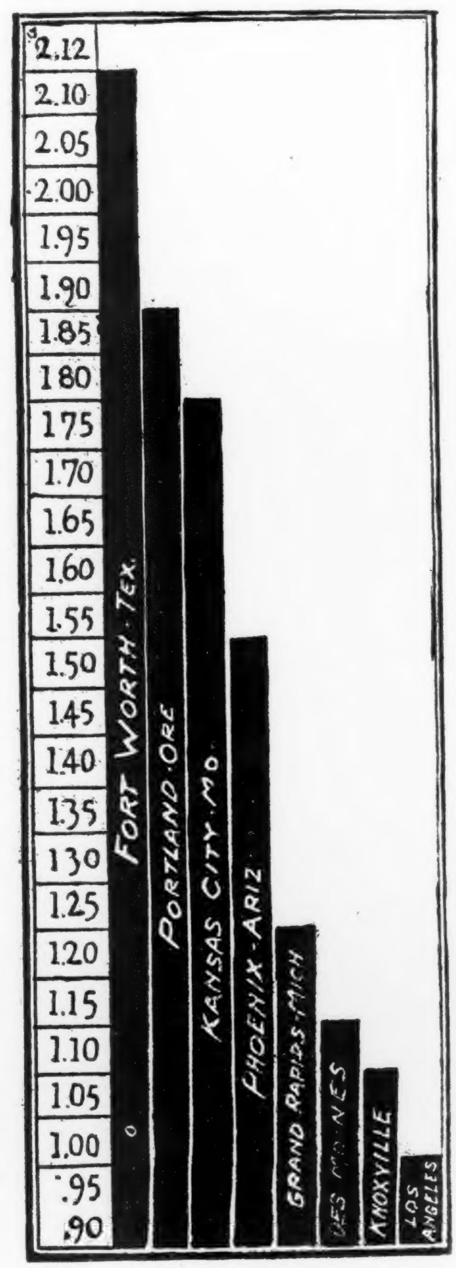
THE headquarters of the southwestern division of the Virginia-Alabama Chemical Co., manufacturers of acid phosphate fertilizers, will be maintained in the First National Bank building, Montgomery, Ala., according to a recent announcement. This division is composed of various Southern and Southwestern states.

Jesse C. Adams has been named as the division sales manager and R. J. Hudson to succeed Mr. Adams as district manager at Montgomery and W. P. Mullen is to be district manager at Birmingham.

Low Prices on Crushed Stone in Los Angeles District

LOS ANGELES appears to be particularly favored by nature and the character of its building material producers in aiding its growth and building activity, according to the Union Rock Co. of Los Angeles, Calif. Not only has the area more than 90 plants devoted to the production of sand, gravel, and crushed rock, but the prices at which these materials are furnished has been found to be among the lowest in the entire United States, the firm report shows.

The figures shown in the chart above have been compiled from statistics by the Union Rock Co. and were published in the Los Angeles *Examiner.*



Prices of 3/4 in. crushed stone on cars

Mining Hard Rock Phosphate in Florida

Production Carried On by Two Companies Which Export to Belgium

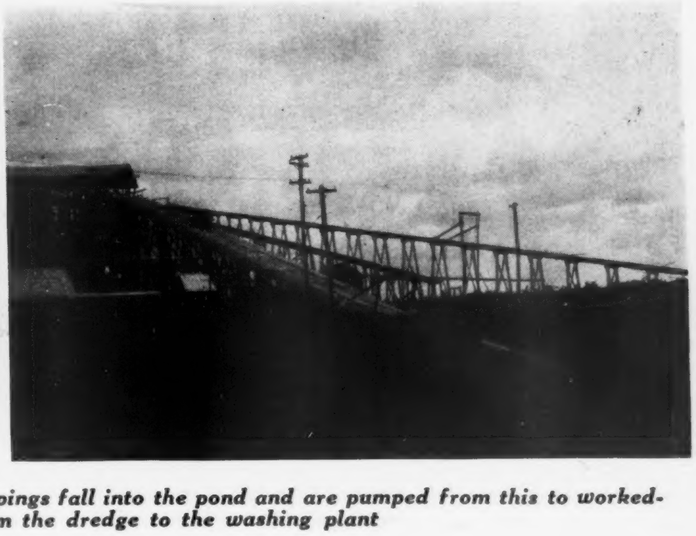
By J. R. Thoenen
Mining Engineer, Greenville, Ohio

FLORIDA has for several years headed the list of phosphate rock producing states but the greater portion of its production has come from the land pebble deposits rather than from the hard rock field. There are four types of phosphate rock occurring in Florida known as hard rock, land pebble, river pebble, and soft phosphate. The latter two at the present time are not being mined and the mining of hard rock phosphate has been steadily declining since 1909 with the exception of one or two years of increased demand.

To the ordinary reader the term hard rock phosphate calls to mind something on the order of a hard limestone which must be drilled and blasted from its position in the earth. In this the name is misleading, as practically the only physical difference between the land pebble and hard rock phosphate is the size of the individual pieces of phosphate rock. Both are found in a matrix quite variable in character and composition, ranging from lenses of sand and clay to intrusions and boulders of limestone, with many examples of fossil remains of both vertebrates and invertebrates. Many flint boulders and nodules are also found. In fact, some deposits contain so much flint that they are not profitable to work. The hard rock phosphate is found in pebbles and boulders ranging in size from sand grains to individual pieces weighing several tons while the land pebble variety seldom contains individual pieces larger than ordinary gravel stones.

The productive field of hard rock phosphate occurs along the northwestern portion of peninsular Florida, extending approximately 100 miles north and south and probably not over 25 miles east and west except for one or two small outlying deposits. Phosphate rock is found in what the State Geological Survey has termed the Dunnellon formation from its occurrence near the town of that name. Geologically this is probably of Pliocene age. Underlying this is found the Vicksburg limestone of earlier Oligocene age. According to the State Geological Survey the phosphate rocks have been formed by the action of circulating ground waters which have disintegrated the younger and overlying strata collecting widely disseminated phosphate from them and redepositing it among the eroded materials as soft phosphate, pebbles and boulders. This would account for the very irregular manner in which it occurs among the sand and clay lenses. Apparently ground waters dissolved portions of the underlying limestone forming caves and sinks and later filled these with debris from the upper strata and when conditions were right deposited the phosphate in them. Hence, as might be expected, the occurrence of the phos-

The dipper dredge which has been found best adapted to digging "hard rock"



Left—Removing the overburden by hydraulicking. The strippings fall into the pond and are pumped from this to worked-out pits. Right—The tramway from the dredge to the washing plant

phate content of the Dunnellon formation is irregular in the extreme. A good appearing deposit found at one locality may eventually turn out to be merely a small pocket or series of pockets, while that at another may prove to be a large workable bed.

This irregular occurrence and the difficulty of accurate sampling, owing to the size of the boulders, increases the troubles of the hard phosphate rock miner in making his prospecting not only laborious but unreliable. Some of the deposits have been opened above the permanent water level and worked by hand. Most of them however lie wholly below the water surface and must be recovered either by digging after expensive and continuous pumping or by dredging.

Although this field was at one time very active there are at present only two operating companies and both produce rock for export only, the greater portion going to Belgium.

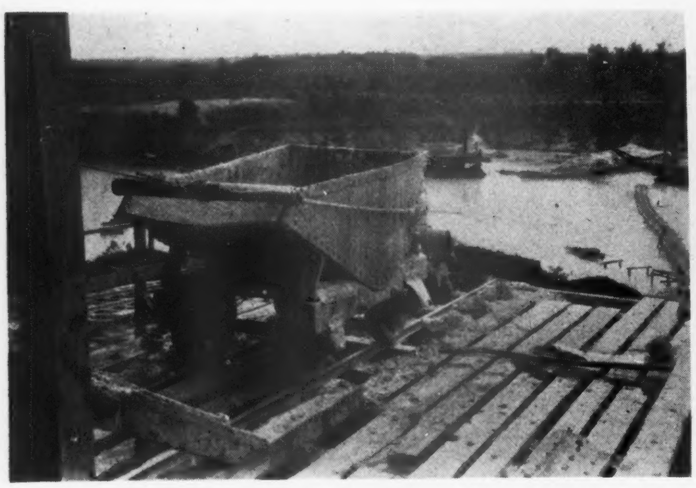
The writer is indebted to D. B. Kibler, manager and R. H. Mountain, superintendent of J. Buttgenback and Co. of Brussels, Belgium, for the data used in the following description of this company's mine and washing plant at Dunnellon.

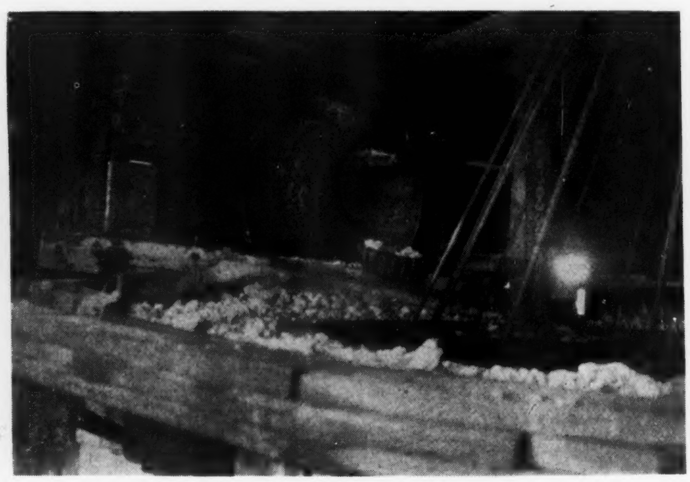
The phosphate formation varying in thickness from 20 to 35 ft. is overlaid with from 10 to 40 ft. of overburden consisting of sand and soil. This is first broken down with hydraulic giants and washed to a central pit where it is picked up by a centrifugal pump and transported to a pit from which the phosphate has previously been removed or to ground under which there is known to be little phosphate rock present.

Storage pile in which the washed rock is held before drying

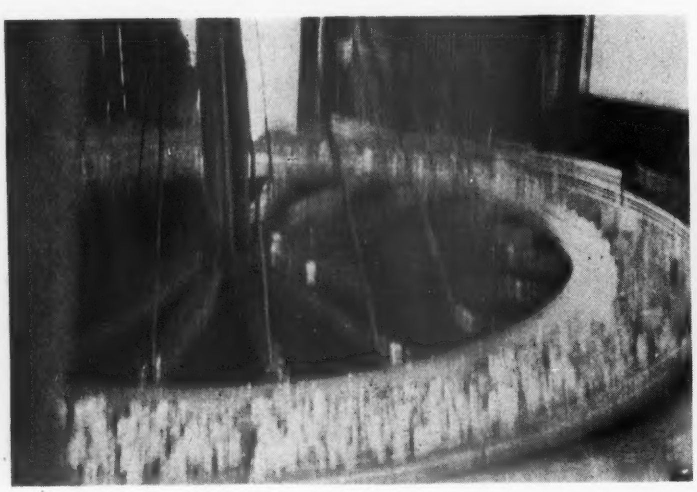
Water for this stripping is supplied from the dredge pond by electrically driven 10- and 12-in. single-stage centrifugal pumps and conveyed through 10-in. pipes and 6-in. hose to the 2-in. nozzles of the giants. Nozzle pressures range from 150 to 200 lb. per sq. in. The practice is to clean off the overburden for some distance ahead of the regular mining operations.

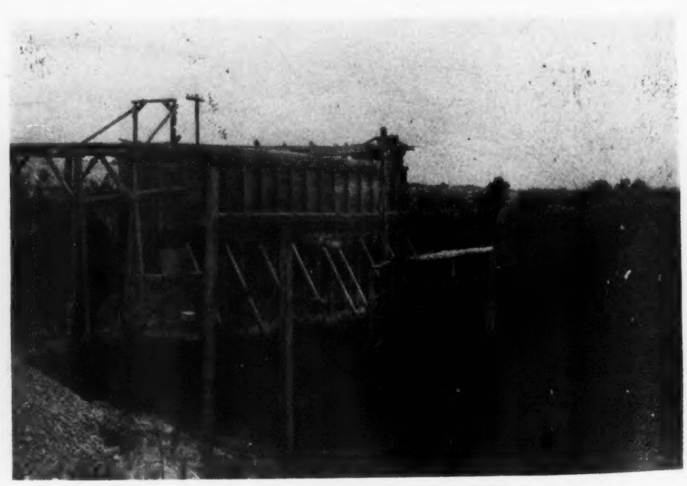
The phosphate and clay-sand matrix is then mined by dredges. The dredges as shown in the accompanying illustrations are of the long boom dipper type, wooden hulls, steam powered and fired with wood fuel. Trestles are built from the sides of the pit and extend out into the pond to within reach of the dredge dipper over which cars are lowered from the washing plant on steel rails. Each dipper full makes a car load and little time is lost in waiting for the





Left—The empty car over the dump. Right—The final screen, with picking table in the foreground





Left—The revolving picking table (picture taken while it was in motion). Right—The loading bins

empty car to be returned to the dredge although the tracks are single and only one car is used at a time to serve a dredge. The loaded cars are hoisted to the washing plant by friction drum hoists driven from a single line shaft.

Cars are of the front end dump type and discharge their load by hoisting the rear end by means of small pulleys attached to either side which engage auxiliary tracks at the dump. The material discharges on a 10-in. bar grizzly through which the large lumps are washed by a stream of water or broken by hand sledging. The rock then passes to a cylindrical trommel, locally called a separator, with 5-in. round hole perforations where the larger lumps are removed and sent to a 30x24-in. McLanahan single roll crusher. The crushed material then joins the undersize from the trommel and is sent to a 30-ft. double log washer.

The fines and overflow from the log washer run to waste and the washed material can be sent to a scrubber revolving screen or to a second log washer with single log as needed, depending on the amount of clay in the feed. In passing from one mill unit to another the material is washed over fine slotted screens which assist in removing the fine sand and clay.

Material from the log washers goes to the double jacketed cylindrical scrubber revolving screen with 3/8-in. perforations in the inner jacket and 1/16-in. perforations in the outer. Oversize from the inner screen passes on to a revolving circular picking table where colored women pick out the clay balls and lime rock and place them on the outer rim of the table from where they are scraped off into the waste bin. Material passing through the inner screen and retained on the outer joins the clean lump rock from the picking table and goes to a storage bin. Fine sand passing the second screen is sent to a settling box and from there pumped to waste.

From the storage bin the clean rock is loaded by gravity to a transfer car and hauled to loading bins over railway tracks or to shed or open air storage.

It will be noticed that no attempt is made to recover any of the fine material although considerable quantities of soft phosphate and fine hard rock are lost in this manner. The writer has been informed that this loss will sometimes amount to as high as 50% of the original phosphatic content of the bank run material. The specific gravity of the fine phosphate rock and sand is almost identical so that it would be very difficult to make a clean separation by concentrating machinery. Moreover the phosphate rock itself varies greatly in density adding further to the difficulty of fine concentration. In spite of this there has been some experimentation along this line with hydraulic classifiers and sand cones such as are used in the Tennessee fields, which has given some promising results.

Wet rock is dried in rotary kilns or stacked in piles over wood and dried by burning the wood. Considerable quantities of finished product are stored on the ground in the open or under sheds where much of the moisture is eliminated by air and drainage. Dried rock is then shipped to the docks at seaports for shipment to European ports.

The percentage of recovery is low, for in order to obtain from 120 to 150 tons of clean rock the dredge and mill must handle from 600 to 750 cu. yd. of bank run material which is in the ratio of about 6 to 1.

Operations are on a 10-hour basis working one shift daily and owing to the climate they are carried on throughout the year without difficulty.

World Trade in Phosphate Rock

THE world production of phosphate rock, which in 1913 approximated 7,000,000 tons, declined to a low ebb during the World War period. The total for 1918 was recorded as 4,262,763 tons. The gradual improvement during recent years in economic conditions in the principal producing and consuming countries has brought about an increased world production. The 1923 output reached the 1913 figure and the 1924 was increased to over 8,000,000 tons, the largest amount yet recorded.

United States Still the Largest Producer

Although the world production in 1924 was over 1,000,000 tons in excess of the 1923, the United States' output fell off 138,917 tons. This country, however, is still the most important producer, being credited with 36% of the total in 1924. Tunis is a very close second with 35%.

The inability of the American phosphate miners to regain their prewar position during 1924 is due principally to the loss of export trade brought about by the strenuous efforts on the part of North African producers to capture the European markets for their products. The following table indicates that exports from the United States during 1923 and 1923 were approximately 450,000 tons less per year than in 1913:

UNITED STATES PRODUCTION AND EXPORT OF PHOSPHATE ROCK

Years	Quantity mined Long tons	Exports: Quantity Long tons	Exports: Value
1913	3,111,221	1,272,892	$ 9,524,089
1920	4,103,982	1,069,712	10,570,175
1921	2,064,025	733,312	7,320,137
1922	2,417,883	719,294	5,858,167
1923	3,006,706	827,551	5,772,171
1924	2,867,789	818,773	5,120,832

North African Competition Increasing

The combined 1924 production of the North African phosphate countries, which include Tunis, Algeria, Morocco, and Egypt, exceeded that of the United States by more than 1,000,000 tons. Unlike the United States, these countries have virtually no home market for their phosphates, and it is to be expected that no efforts will be spared on their part to develop foreign trade. On the average the North African phosphates are lower in grade than high-grade Florida rock, but the close proximity to important consuming markets and low ocean freight rates have made them formidable competitors in European markets.

During 1913 the United States shipped to Belgium 124,601 tons, whereas in 1924 American exports only reached 57,969 tons. In the former year the United States supplied 53% of the total Belgium imports and North Africa 34%. In 1923 North Africa advanced to 62% while the United States dropped to 34%. Similarly, by analyzing the trade of the Netherlands, it is found that the United States shipments have declined from 153,923 tons in 1913 to 123,862 in 1924, whereas during the same period receipts from North Africa have increased.

Germany the Largest Purchaser of American Phosphate

Germany continues to hold the first place as an export market for American phosphate, although the trade has changed considerably since 1913. Shipments of high-grade hard rock have declined from 259,441 tons in 1913 to 92,021 in 1924. Exports of land pebble during the same period, however, show an increase of about 25%, the total in 1924 being 129,213 tons. Consumption of phosphate by German agriculturists at the present time is considerably less than in previous years. There has also been a decided shift from phosphate rock to basic phosphate slag, of which Germany imported in 1924, 517,610 tons from the Lorraine, French, Luxemburg, and Saar steel mills.

American phosphates have been supplanted in France by the North African product, but the trade with Spain has increased from 66,998 tons in 1913 to 110,146 in 1924.

Shipments to Japan during the same period have declined from 67,392 tons to 45,733. The loss in this case is not due to North African competition but is caused by the exploitation on a large scale of the phosphate deposits of Anguar, which island was mandated to Japan by the treaty of Versailles.

American Imports of Phosphates

Notwithstanding the large production of phosphate rock by the United States, there has always been a small American import trade in this commodity. During the World War period importations reached a very low point, but since 1920 have increased steadily. The receipts in 1924 aggregate 16,098 tons, of which one-third entered continental United States from the Netherlands West Indies. The remainder was entered at Hawaii and originated in French Oceania.—*Commerce Reports.*

Powdered Hydrocyanic Acid

A NEW form of hydrocyanic acid has been recently developed for use as a fungicide. The product is made from calcium carbide and hydrocyanic acid and is in powder form which on contact with moist air releases the toxic hydrocyanic acid. This is of interest to lime manufacturers for lime is used in the making of calcium carbide and with a demand for the new product, greater amounts of lime will be required.

Gas-Fired Lime Kilns*

Efficient Regulation of Gas Producers—Kiln Design and Construction for Economical Lime Burning

By Gustav Streck

THIS is the first part of an article by a prominent German engineer on his experiences making lime in kilns fired by producer gas. Producer gas is the most efficient fuel if conditions such as kiln dimensions, type of stone, the producer itself, etc., are adjusted on a basis of experimental data gained through actual kiln runs. Lime manufacturers in this country who are using or intend to use producer gas can gain much helpful information by a careful reading of this and the succeeding installment.

THE gas-fired shaft kiln used for calcination of lime still encounters certain prejudice in the wide circles of the lime industry. In trying to determine the cause of this, one often hears the opinion that gas-fired kilns yield a non-uniformly burned product and, above all, a high percentage of underburned clinkers. Numerous instances are cited of gas-fired kilns discontinued, rebuilt as kilns with outside firing, or operated as kilns with mixed firing. These arguments are frequently based on actual facts. On the other hand, very good results have been obtained with gas firing, both from the point of view of economy of operation and quality of the product. These results have proved that gas-fired kilns are suitable for lime calcination and, further, have advantages over the other types of kilns. The failures which made their appearance cannot be attributed to gas firing itself; their causes should be sought in the construction or operation of the kilns. Below I will describe my experience with a gas-fired kiln in a plant operating under my personal supervision.

First, I will state briefly a few details of the kiln and of the nature of the rock used. The gas-fired kiln has a height of 15 meters (50 ft.) up to the charge; the shaft has an elliptical cross section which increases from the charge to the level of the gas flues in the burning zone and decreases towards the draft at the bottom. The major axis of the ellipse in the burning zone is 330 cm. (11 ft.); the minor axis originally scaled 170 cm. (5 ft. 8 in.), but I found it necessary to have it reduced to 130 cm. (4½ ft.). The gas is admitted through eight flues, four on each longer side of the shaft. The air supply for combustion enters through the draft openings, is preheated in its upward course by direct contact with the burned lime, and combines in the burning zone with the gas. Drawing of the lime is effected through four doors. Two rows of peepholes are provided for purposes of observation of the flame and of cleaning the shaft from such parts of the lime mass as remain hanging upon drawing. The first row is located about 100 cm. (3 ft. 4 in.) above the gas intakes, the second about 200 cm. (6 ft. 8 in.) above this level. The lining of the lower portion of the kiln consists of refractories and brickwork 170 cm. (5 ft. 8 in.) thick provided with anchoring bars; in the section above this the lining is only 30 cm. (1 ft.) thick and has a sheet steel coat 7 mm. (0.28 in.) thick. The kiln has no stack, the exhaust gases being removed by suction produced by a fan. Upon being purified these gases are utilized for industrial purposes. The power house installation consists of two built-in gas producers with plane grates, 150x150 cm. (5x5 ft.). These are situated about 7 meters (23 ft. 4 in.) from the kiln The gases are led through flues from the producers to the center of the kiln and through the kiln walls to the burning zone. The kiln was designed in its original dimensions for a daily capacity of 10 to 12 tons burned lime.

Limestone Described

The limestone belongs to the mesozoic period and is to be classed (as to age) with slate. In general, it has a light gray color; occasionally a pure limestone of a darker color is encountered. The strata have a general direction from southwest to northeast and dip 30 deg. northwest in relatively thick layers. Strata of lesser depth are encountered in places of a varying deep red, reddish brown and bluish grey color. The grey limestone has the following chemical composition:

	Per cent
Silica	1.65
Iron oxide and alumina	1.66
Lime	52.57
Magnesia	1.60
Loss on ignition	42.71

It burns to form a dense white product with fine brown veins (alumina and silica). Due to its exceptional density, the specific gravity of burned lime is relatively high and hydration requires special precautions. The lime should be sprinkled with as small a quantity of water as possible and should be left undisturbed. The reaction sets in only after some time has elapsed and brings about chemical decomposition rather rapidly. If an excessive quantity of water is added, parts of lime remain unhydrated through excessive heat evolution and form lumps.

First Kiln Operations Unsatisfactory

The plant was built in 1914. Due to special conditions, it was not put into operation until 1923. The general results of the first period of its operation were not entirely satisfactory, even when one considers the unavoidable struggles of a new kiln and inexperienced operators. It appeared that the temperature required for burning was reached at the center of the kiln only with difficulty and at the expense of long periods of burning. With prolonged burning the daily capacity could not be reached and the per cent coal consumption was increased. The average output of the kiln was 9 tons lime in 24 hours; the coal consumption was about 40% by weight of burned lime, when a Bohemian brown coal of 4800 W.E.,* burning with a long flame, was used. As a further result of longer calcination overburned lime was easily produced in the vicinity of the eyes; at the same time, the underburned material was not eliminated. Though the percentage of the latter was not considerable—an average of about 3 to 5%—its occurrence was objectionable due to unfavorable drawing conditions.

Having visualized the method of construction described above and the operation fixed by it, taking also into account that not compressed gas, but gas at normal pressure was used and that suction was created by the kiln draft, the results no longer appear surprising. The gas, i.e., the flame produced at the eyes pursued its horizontal direction only over a short distance; it was deflected upwards due to the resistance of the limestone mass, to the draft created by the admission of air for combustion, to its natural tendency to rise and to suction. Its action no longer extended to the center of the kiln. Experiments with stronger draft, reduction of the air supply down to the allowable minimum, a mixture of brown coal with hard coal of high thermal value helped bring about improvements but failed to eliminate the difficulties. To reach complete success, more radical measures had to be adopted: a reduction of the shaft area or the use of pressure.

*Translated from *Tonindustrie-Zeitung*, 98, *1381* (1925), by M. Arronet, Lewis Institute, Chicago.

A careful investigation of both methods, with due consideration of local conditions, led to decreasing the minor axis of the elliptical shaft area from 170 cm. (5 ft. 8 in.) to 130 cm. (4 ft. 4 in.). The second method involving pressure gas was dropped as the initial and maintenance costs of such an installation did not compare favorably with the expected greater kiln efficiency

Kiln Rebuilt to Meet Conditions

The kiln was rebuilt by two masons and one helper within a period of three weeks during the winter season of 1923-24. The work progressed in such a manner that about 100 cm. (40 in.) below the eyes, along each longtitudinal side of the ellipse, new rows of lining were put in, until the distance—wall to wall—was 130 cm. (52 in.). These rows of refractories were then produced upwards until they intersected the cone of the burning zone. All projections were carefully avoided in the burning zone, so that the descending limestone mass met no obstructions.

The work of remodeling was carried out by breaking and replacing small section so as not to damage the kiln. Special attention was paid to securing good joints, neat laying of the refractory lining and careful bond between the new and old lining. The effective shaft area in the burning zone was thus reduced from 4.70 sq. m. (52 sq. ft.) to about 4.00 sq. m. (45 sq. ft.), i.e., by about 0.70 sq. m. (about 7 sq. ft.).

In connection with this work changes were made in the lining of the upper section of the kiln, which, as mentioned above, originally consisted of a refractory lining 30 cm. (1 ft.) thick and of a sheet steel lining 7 mm. (0.28 in.) thick. "Thermalit" block 70 mm. (about 2¾ in.) thick were used up to an elevation 400 cm. (13 ft. 4 in.) above the eyes, as radiation of the old walls was so strong that it was impossible to stay near it. The erecting contractors had to guarantee that the surface of the kiln during operation would have no greater heat than a human hand, a condition which was thoroughly satisfied.

The changes were successful. The kiln output now averages 13 tons burned lime per 24 hours; the coal consumption is 33%, when a Bohemian brown coal, burning with a long flame, is used. The fuel value of this grade of coal is 4800 W.E.* The per cent of underburned lime is zero.

The output, as well as the fuel consumption of a kiln stand in a definite relation to the rock which is being burned. The purer the limestone, the higher the temperature required for burning. Increasing temperature, however, decreases the output of a kiln and raises the fuel consumption. I will quote some data of fuel consumption in local plants, using the same limestone:

Circular kiln with spray firing 25% hard coal..	6500 W.E. (26,000 B.t.u.)
Shaft kiln with outside firing 45% brown coal	4500 W.E. (18,000 B.t.u.)
Field kiln with wood firing 90% pine wood....	3000 W.E. (12,000 B.t.u.)

or, per 100 kg. (220 lb.) burned lime, this would be:

Gas fired kiln..........	158 400 W.E. (630,000 B.t.u.)
Circular kiln with spray firing............	162 500 W.E. (650,000 B.t.u.)
Shaft kiln with outside firing	202 500 W.E. (800,000 B.t.u.)
Wood fired kiln......	270 000 W.E. (1,080,000 B.t.u.)

Without doubt, the good results obtained with the gas fired kiln, greatly above those of its first period of operation, depend on more experienced operators, as well as on the correct and economical selection of fuel.

Conditions for Best Results

The first condition for successful and certain operation of the kiln is the generation of a good and uniform gas. The gas is good if it has a white or olive green color (depending upon the fuel) and if, when ignited at the flues leading from the producer, burns immediately and does not go out of itself. A bluish black or black color are not acceptable—they indicate that the gas burns in the producer. This occurs when the fuel level gets low in the producer and when rings are formed. In the first case several charges of coal should be added immediately; in the second case, the rings shall be removed from above or below, as the case may be, and several charges of coal added. The level of coal in the producer depends upon the size of coal. The finer the coal, the lower shall be this level and vice versa. I am at present using coal 50 to 70 mm. (2 to 2¾ in.) in size and have found the correct distance to be 800 mm. (32 in.) both with respect to gas production and quality of the gas. A graduated rod is used to control this level. When looking through the peepholes no flame should be visible, at most, the spaces between the black lumps of coal should appear glowing red. It is important for the successful operation and efficiency of the producer to distribute a uniform supply of fuel over the entire area at short intervals and in small quantities. When plane grates are used sprayed charges, as frequently encountered, should not be used, as they discharge the coal in one direction and produce different levels within the producer, reducing the gas product in the high levels and permitting complete combustion in the troughs. When step grates are used this method of charging the producer is satisfactory, as conditions become different. Conical discharges are preferable with plane grates. Assuming that the cone has the proper shape and diameter, it is possible to distribute the charge evenly at the center and at the sides depending upon the rate at which the cone is lowered. Cleaning of the producer and of the grate depend upon the percentage of ash of the coal. Using Bohemian coal from the Grohmann mine, I let drawing and cleaning of the producer occur every six hours. In general, the producer should not be disturbed, as frequent disturbances produce unevenness in the horizontal layers and prevent the formation of a uniform gas of good quality. To facilitate cleaning of the grate, ample clearance shall be provided wherever necessary, so that the grate does not become sealed. The clearance at the back shall measure at least 150 mm. (6 in.); the space between grate and masonry at least 200 mm. (8 in.). To eliminate unnecessary producer losses, the grates shall be adjusted to correspond to the angle of drop. A steam bath shall be kept below the grates. The steam reduces the formation of ash and cools the grates. The reflection of the grate, particularly the glowing lines of the openings, immediately inform the observer as to the condition of the grate. When the red lines disappear in the water, it is time to clean the grates. In my opinion, it is not advisable to leave a layer of ash about 100 mm. (4 in.) for the protection of the grate, as sometimes recommended. Producers operated in this manner do not function efficiently; i.e., their gas output becomes reduced. Depending upon the composition of the gas product, the gas flame appears less luminous and mellow shortly before and shortly after changing. When red heat is observed within the producer, a retarding effect soon becomes noticeable. This is to be avoided by alternately cleaning and charging the producers, when the plant has more than one. In general, a light pressure should be kept within the producer, as it insures safety. If no pressure is present, air may gain access to the producer or the flues through valves or porous places in the masonry and may cause the formation of explosive mixtures of gas and air.

Coal Should Be Carefully Selected

As a rule, the grade of coal selected for the operation of a producer shall have no baking properties, shall contain a small percentage of ash and no impurities, as the latter might render the operation exceedingly difficult, impairing not only the production (as it would be impossible to keep the producer in a lastingly good condition), but creating losses through the unavoidable frequent cleanings necessitating the removal of a certain quantity of unburned coal and coke. Frequent cleanings are also undesirable from the point of view of the welfare of the laborers, who suffer especially on hot summer days. Aside from this, the masonry becomes impaired.

Strong draft is the next condition in the order of importance for good kiln efficiency. It is impossible to obtain uniformly burned lime in any type of a kiln without sufficiently strong draft. When good draft is provided, the flame is directed more towards the center of the kiln, the charge moves undisturbed (no channeling), shows a uniform thickness over the entire shaft area, and often appears more uniform at the center than at the sides. With weak draft the flame acts only over a short distance toward the center, becomes deflected too soon, and

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*W.E. designates Warmeeinheit meaning "thermal unit." The German thermal unit is a kg. cal. To reduce the above to English units use the relation:

1 kg. cal.=3.968 B.t.u.
1 B.t.u.=.252 kg. cal.

rises upwards along the walls, while a dark core soon begins to form at the center of the kiln, which cannot be eliminated with continued weak draft and is removed as unburned lime. The draft is low when above the eyes at the peepholes no suction exists and a hand held in front of the hole receives the heat from the kiln.

Height of Kiln Stack Important

Most kilns have stacks 8 meters (26 ft. 8 in.) high from the charge opening. I consider this height as insufficient and would specify a height of at least 12 to 15 m. (40 to 50 ft.) unless suction and power are used. There is no doubt that suction has a great practical advantage over natural draft as it furnishes uniform draft conditions, independent of the weather. Regulation is same as for stack draft. Maintenance cost of a fan, not including the power, is nil. The cost of current or other motive power in most cases becomes justified by the increased output; this is doubtlessly true in cases where cheap local current or water power are available. Quick burning brings about a saving of coal.

Regulation of Gas and Air Admitted to Kiln of Great Importance

In close relation to the draft conditions is the method of firing; i.e., first, obtaining the proper proportions of gas and air, and second, regulating the gas and air volumes, thus varying the supply of one or the other in accordance with the requirements of the kiln. Burning with excess air or excess gas not only considerably retards the desired temperature, but lowers the maximum temperature obtainable with the given fuel. On the basis of systematic experiments consisting of recording temperatures and drawing samples of fuel and exhaust gas, I prefer to work with a slight excess of gas, assuming normal conditions in a gas-fired kiln. In this way, the glowing mass is formed more rapidly at the center of the kiln, is better preheated, and thus conforms to the conditions of easy and rapid burning. Aside from this, defective operation by inexperienced operators has no effect on the functioning of the kiln in spite of greater sensitiveness of the gas-fired kiln.

Excess Air Lowers Kiln Efficiency

Firing with excess air, i.e., with a short flame, even for a short time, some of the heat is lost; i.e., the functioning of the kiln is impaired. There is only one way of correcting this error, which is accomplished by completely shutting off the air supply at the bottom, admitting air at the eyes and providing good draft. Conditions similar to those of a kiln with outside firing are thus produced, necessitating a higher coal consumption. Firing proceeds for an hour with a long, oxidizing flame raising the temperature at the circumference of the shaft. Following this, the gas supply is increased at intervals of half an hour, keeping the air supply constant. The flame becomes longer, gradually assumes a neutral, later a reducing character, and thus cools the outside and produces greater heat at the center. Within four hours the kiln operation is restored to normal. During the "light burning"—a term I introduced to distinguish from the "dark burning" at normal operation—the operator should not leave the kiln, as each variation in gas supply should be balanced immediately and the flame increased gradually and uniformly. Relapses, meaning time and fuel losses, should not occur.

Immediately before drawing — assuming that the limestone mass has descended uniformly—it is of advantage to use a neutral flame. If the glowing of the mass has slightly relented, a little more gas may be admitted safely and, shortly before drawing again, another addition may be made. This produces a certain cooling effect on the outside, drives the red heat towards the center and improves preheating conditions. Good firing is, in the end, a matter of experience. The eye gradually becomes trained to judge from the appearance of the mass and of the flame what is to be done in each case.

Gas and Air Controls Necessary

Adequate control of gas and air supply should be provided to regulate the composition of the flame. Such control is generally present for gas, but is lacking for air in most cases. The doors of the tap openings, which ordinarily admit the air required for combustion (unless secondary air admission is provided) should close tightly and be provided with openings capable of regulation for the admission of air.

(To Be Continued)

Lime Production in 1925

THE lime sold in the United States in 1925 amounted to 4,510,000 short tons, valued at $42,530,000, according to estimates furnished by lime manufacturers to the Bureau of Mines, Department of Commerce. These figures show an increase of 11% in quantity and 7% in value over the sales in 1924. The sales of hydrated lime, which are included in these figures, amounted to 1,505,000 tons, valued at $14,926,000, an increase of 14% in quantity and 13% in value. The average unit value of all lime showed a decrease from $9.72 a ton in 1924 to $9.43 in 1925, and that of hydrated lime a decrease from $10.03 a ton in 1924 to $9.92 in 1925.

Ohio, the leading state, showed an increase of 13.5% in total sales and 14% in sales of hydrated lime. Pennsylvania, which ranked second, showed an increase of 12.5% in total sales. Of the 22 states in which more than 25,000 tons were sold, only three showed decreased sales.

Sales of building lime were about 2,365,000 tons, an increase of 9%. The estimated sales of chemical lime for 1925 were 1,885,000 tons, an increase of 14%. The dead-burned dolomite reported as sold for refractory is estimated at 375,000 tons compared with 328,659 tons in 1924. The demand for lime for use in agriculture was somewhat better in 1925 than in 1924, and the sales are estimated at 260,00 tons, an increase of 5%.

LIME SOLD BY THE PRODUCERS IN THE UNITED STATES IN 1924 AND 1925

State	1924			1925 (estimated)		
	Hydrated lime (Short tons)	Total lime (Short tons)	Total lime Value	Hydrated lime (Short tons)	Total lime (Short tons)	Total lime Value
Ohio	654,763	934,407	$9,511,270	745,000	1,061,000	$10,664,000
Pennsylvania	189,431	700,380	5,634,806	210,000	788,000	6,434,000
West Virginia	44,841	238,714	1,884,682	52,000	295,000	2,095,000
Missouri	60,651	243,465	2,354,175	74,000	272,000	2,605,000
Wisconsin	18,246	235,030	2,129,701	21,000	243,000	2,140,000
Massachusetts	(*)	194,402	2,693,028	(*)	195,000	2,520,000
Virginia	38,001	172,776	1,409,447	50,000	190,000	1,460,000
Alabama	23,465	204,059	1,812,282	27,000	180,000	1,550,000
Tennessee	44,242	144,292	1,111,781	43,000	177,000	1,318,000
Indiana	44,697	116,927	991,003	43,000	126,000	1,022,000
Maine	(*)	125,688	1,809,929	(*)	117,000	1,600,000
Illinois	(*)	89,132	934,199	(*)	98,000	1,017,000
New York	(*)	98,592	991,799	22,000	94,000	906,000
Michigan	(*)	73,096	702,072	10,000	91,000	874,000
Texas	25,496	60,565	570,334	29,000	70,000	678,000
Vermont	(*)	56,484	710,739	(*)	69,000	741,000
California	(*)	59,583	658,138	13,000	66,000	857,000
Connecticut	(*)	58,851	796,541	(*)	63,000	762,000
Maryland	29,134	56,178	470,105	38,000	59,000	500,000
Arizona	(*)	27,972	331,756	(*)	46,000	460,000
Washington	(*)	28,188	353,450	(*)	29,000	355,000
Minnesota	(*)	25,764	319,066	(*)	(*)	(*)
Undistributed	143,697	127,455	1,416,120	128,000	181,000	1,972,000
Total	1,316,664	4.072,000	39,596,423	1,505,000	4,510,000	42,530,000

*Included under "Undistributed."

State Purchase of Cement Plant Before Grand Jury

GRAND jury probe of statements made in connection with the purchase of the Chelsea cement plant by the state and statements of M. E. Brogan, former state prison employe, concerning the construction of the new Jackson state prison, was ordered recently by Circuit Judge Benjamin Williams. Action of the judge followed filing of a bill of complaint setting up the charges to be investigated by Prosecutor John Simpson.

The complaint, naming the person making the cement plant charges as John Doe, sets up that the said John Doe claims the plant could have been purchased for a smaller sum; that inferior quality of cement was made at this plant which was not fit for the construction of the new prison.

What witnesses will be summoned to testify before the grand jury was not made public.

The investigation will be conducted seretly with Judge Williams sitting as a one-man grand jury.—*Detroit (Mich.) Free Press.*

Plans of the New Florida Portland Cement Company

THE following announcement of the plans of the Florida Portland Cement Co. has been received direct from the headquarters of the organization in Chicago:

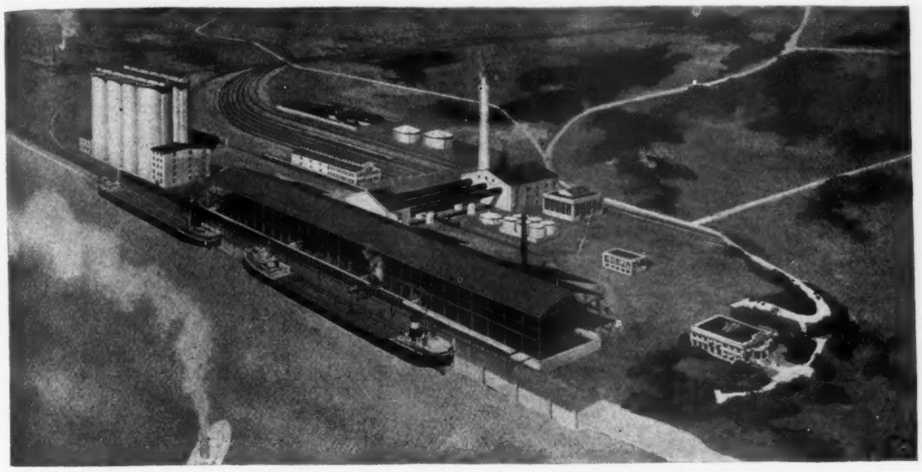
"At a recent meeting of the board of directors of the Florida Portland Cement Co. a contract was signed awarding the construction of the $5,000,000 plant to be built at Tampa to the Cowham Engineering Co. of Chicago. As a result of the contract awarded to the Cowham Engineering Co. a sub-contract has been signed with the Foundation Co. of New York for the construction of the docks and underground structures.

"Contracts for the equipment of the new plant will be placed immediately by the Cowham Engineering Co. and all efforts made to rush the completion as rapidly as possible. The plant will be designed according to the general layout adopted by the Cowham Engineering Co. and now in successful operation at the plant of the Signal Mountain Portland Cement Co. at Chattanooga, Tenn.

"The raw materials for the Florida Portland Cement Co. will be obtained from deposits in Hernando county near the town of Brooksville, about 48 miles north of Tampa. Approximately 600 acres of limestone and clay have been purchased. This has been estimated as sufficient to manufacture 160,000,000 bbl. of cement. The raw materials properties are located on the Tampa Northern railroad, which will supply direct service to the plant at Tampa.

"Both the limestone and clay have been carefully analyzed and found to be especially satisfactory for portland cement manufacture. A carload of the raw materials was shipped to the plant of the Peninsular Portland Cement Co. at Cement City, Mich., where it was ground, burned and mixed as in actual manufacturing practice. The tests showed the materials to be exceptionally well suited for commercial operation, especially because of the soft texture of the stone, considerably reducing the cost of grinding.

"A 25-acre site on Hookers Point, Tampa, has been selected for the location of the plant. This site is served by the Tampa Northern railroad and will provide excellent rail as well as water shipping facilities. The plant will be located within the corporate limits of Tampa.



Architect's perspective of the proposed plant of the Florida Portland Cement Co. at Tampa, Fla.

"It is expected that the greatest distribution of the finished product will be within the state of Florida. However, the location of the plant on Hillsboro Bay will allow direct loading into ocean-going boats for coast-wide and foreign shipments. It is also planned that fuel may be obtained by water shipments.

"The initial capacity of the plant will be 1,500,000 bbl. annually. Three 11x125 ft. kilns will be installed immediately and plans will be made to allow the installation of two additional kilns in the near future. Waste-heat boiler equipment has been included in the original proposal. This installation will be sufficient to furnish power and light for the entire mill. Complete dust proof equipment will be installed. Shipping facilities will be equally adaptable for motor truck, freight car or boat. The plant will be entirely of steel and concrete construction. It is estimated that the plant will employ about 175 workmen.

"The plant will be equipped with concrete storage bins for the finished product holding 150,000 bbl. Fuller-Kinyon equipment will be used for pumping the cement from the finish grinding department to the storage bins. It is the intention of the Florida Portland Cement Co. to make their plant one of the most modern in existence. The finish grinding department will have a capacity of 8000 bbl. a day to take care of any peak demand that the market might warrant.

"The Florida Portland Cement Co. has been organized with John L. Senior as its president. Mr. Senior has been identified with the cement industry for a number of years and is known for his success in cement plant operation. He is president of the Signal Mountain Portland Cement Co. at Chattanooga, the Peninsular Portland Cement Co. at Cement City, Mich., and is a director of the Peerless Portland Cement Co. with plants at Union City and Detroit, Mich., and the Trinity Portland Cement Co. with plants at Fort Worth and Dallas, Texas. Associated with Mr. Senior as vice-presidents will be R. A. Drum, vice-president of the Cowham Engineering Co. of Chicago, and H. J. Weeks, assistant general manager of the Signal Mountain Portland Cement Co. of Chattanooga. R. N. Cowham, vice-president of the Peninsular Portland Cement Co., will be secretary and treasurer of the Florida Portland Cement Co. The other members of the board of directors will be: J. L. Caldwell, president of the Tennessee Stove Works, Chattanooga Stove Works, Chattnooga, and vice-president of the Signal Mountain Portland Cement Co., Chattanooga; J. A. Griffin, president of the Exchange National Bank, Tampa; J. P. Hoskins, president of the First National Bank, Chattanooga, and treasurer of the Signal Mountain Portland Cement Co., Chattanooga; H. T. Lykes, Lykes Brothers, Tampa; H. C. Piper, of Lane, Piper and Jaffray, Minneapolis; W. A. Sadd, president of the Chattanooga Savings Bank, Chattanooga, and chairman of the board of directors, Signal Mountain Portland Cement Co., Chattanooga; W. H. Wildes, of E. H. Rollins and Sons, Chicago.

"The financing of the project will include a public offering soon to be made by the Cowham Engineering Co. About $2,500,000 has already been subscribed by the original syndicate nad the remainder will be offered to the public within the next 30 days."

Lost Securities of Southern States Cement Company President Found

AFTER search extending from Georgia to the financial centers of New York, approximately $1,000,000 in stocks and bonds belonging to the estate of Thomas J. Flournoy, has been found wrapped in an old newspaper and chucked away in the cement vault of the Southern States Cement Co., of which he was president.

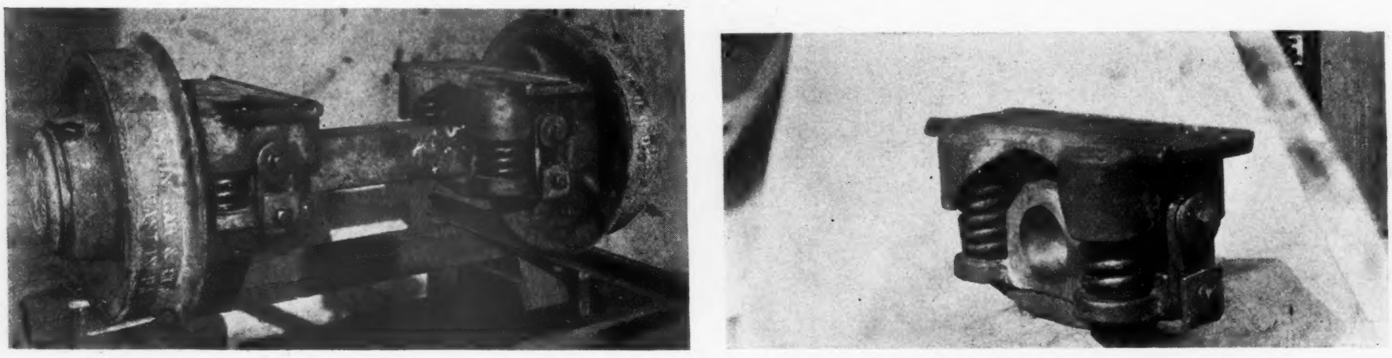
The Fidelity and Columbia Trust Co. of Louisville, in administering the estate, found that he was worth about $2,000,000 in securities, although only about half of this amount could be located. Efforts to locate the remainder of the fortune led to the discovery of the securities in the vault at the cement plant at Rockmart, Ga., used by the company.

Hints and Helps for Superintendents

Experience with Roller Bearings on Quarry Cars

By J. H. COOK
Treasurer, Hartford Sand and Stone Co., Hartford, Conn.

WE have found that there is considerable advantage derived from the use of roller bearings on our quarry and sand-pit cars, from the fact that the cars move much easier and do not require as large a locomotive for doing the same work.



Roller bearings for quarry cars make their operation easier and increase hauling capacity

In our quarry work the tracks are more or less temporary, as they follow the shovel in the operation. The roller-bearing cars start much easier, and take the curves much easier.

In our sand pit we haul over about a half-mile track, and we have some very steep grades; in fact, so steep that we are at the limit of our locomotive capacity at these points. We can actually haul 25% more load over these grades with the roller-bearing cars.

The roller bearings also retain the grease much better than the plain bearings, it only being necessary to pack these bearings in grease once a year. The roller bearings also take the thrust of the curves which is not as well provided for in the use of plain bearings.

In summing up the whole situation, we find that the roller bearings are much cheaper to use, although they do cost about double the price of the other equipment.

Simple Method of Oiling Cableway Ropes

By C. G. KNOBLAUCH
Superintendent J. C. Stewart Co., Oxford, Mich.

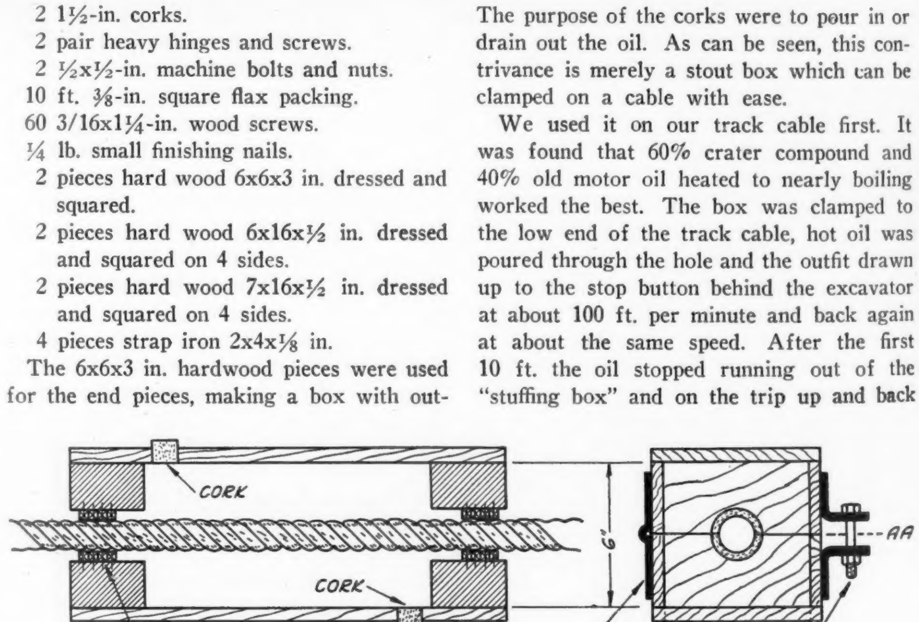
THE enclosed sketch may help some operator to turn to pleasure the despised job of lubricating the wire rope on a slackline installation.

The writer had this job to do in connection with preparing the Oxford, Mich., plant of the J. C. Stewart Co. for the winter. It was found in our case that not only the track cable but also the guy cables were badly rusted, and in view of the fact that these cables were for the most part inaccessible, some other way had to be contrived to supplant the usual paint brush and hot oil job.

The method used is shown in the accompanying sketch. The material consisted of the following:

2 1½-in. corks.
2 pair heavy hinges and screws.
2 ½x½-in. machine bolts and nuts.
10 ft. ⅜-in. square flax packing.
60 3/16x1¼-in. wood screws.
¼ lb. small finishing nails.
2 pieces hard wood 6x6x3 in. dressed and squared.
2 pieces hard wood 6x16x½ in. dressed and squared on 4 sides.
2 pieces hard wood 7x16x½ in. dressed and squared on 4 sides.
4 pieces strap iron 2x4x⅛ in.

The 6x6x3 in. hardwood pieces were used for the end pieces, making a box with outside dimensions 7x7x16 in. Through the end pieces there was bored a 2-in. hole in line with the axis of the long way of the box, and the box was then sawed length-ways along the line AA, and the hinges fastened as shown on the sketch, with the strap iron drilled and placed as shown.



Details of box used to oil cableway ropes

It is important that the box be securely screwed together before sawing and that strips of felt be tacked along the sawed edge, and the hinges so placed as to allow a nearly water tight box when the bolts are drawn down tight. The flax packing was cut in half rings and nailed to the block as shown. We found it better practice, however, to leave a ¼-in. space between rings. Since our cables were all 1⅛-in., the ⅜-in. packing together with the 2-in. hole made it just right.

The purpose of the corks were to pour in or drain out the oil. As can be seen, this contrivance is merely a stout box which can be clamped on a cable with ease.

We used it on our track cable first. It was found that 60% crater compound and 40% old motor oil heated to nearly boiling worked the best. The box was clamped to the low end of the track cable, hot oil was poured through the hole and the outfit drawn up to the stop button behind the excavator at about 100 ft. per minute and back again at about the same speed. After the first 10 ft. the oil stopped running out of the "stuffing box" and on the trip up and back there was not a spot on the track cable that had not received a coating of oil. Next came our guy cables. Here we placed a man up in the crows nest on the mast with a long clothes line, the box being fastened to the lower end and the man on the ground end of the guy also had a clothes line with one

end fastened to the box. They simply pulled it up and back again, one round trip on each guy. Three hours of time was consumed to lubricate our 500-ft. track cable and eight 160-ft. guys, a total of 1940 ft., and over half the time was spent in heating the oil. The box improves with use, because of the congealing compound on the packing rings. The packing rings did not need replacing once. About a pint of oil was lost through the end holes.

Since this was done in cold weather, we learned a few extra wrinkles. For one, we found that a couple of handsfull of 1-in. gravel heated and placed in the box with the oil, kept the oil thinned down. This contrivance lends itself to some improvements, but the writer knows of no other way to so quickly and completely lubricate cables.

A Truck for Ready-Mixed Concrete

THE Fort Worth (Texas) Sand and Gravel Co. runs a mixing plant for making concrete. One of the problems connected with the development of the business was to find a way of delivering the wet mixed concrete so that none of it would be left sticking to the body of the truck by which the delivery was made.

Truck for delivering ready mixed concrete

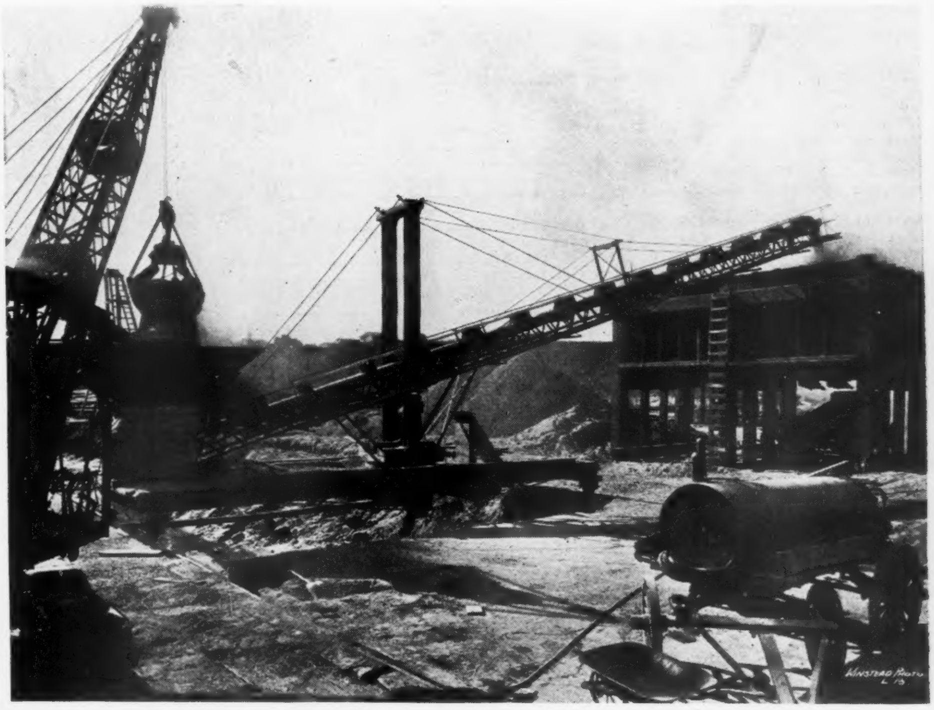
After some experimenting the truck body shown in the picture was devised and several of them are now in use and are giving full satisfaction. The load of mixed concrete slides out quickly in a single mass and nothing is left behind.

The body is the usual length, but it is 4 in. wider at the rear end, where the end gate is, than at the front end. This makes the sides taper slightly toward the front end. As the concrete slips out it pulls away from the tapered sides and is freed from them. The principle is the same as that used in making castings drawn from a mold.

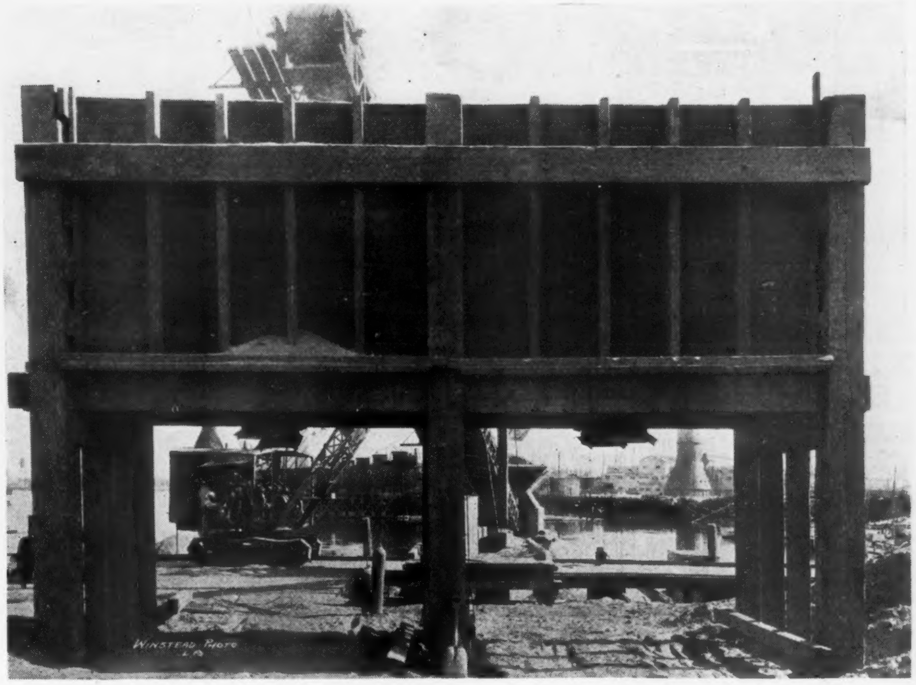
The body is made from 2-in. plank well ironed and lined with sheet steel. The sheet steel lining is all that ever needs replacing.

An Unusual Belt Conveyor

A PORTABLE belt conveyor of unusual design is one of the features of the new Graham Bros., Inc., West Basin plant, San Pedro, Calif. The conveyor is pivoted at the center so that its feeding hopper may be placed anywhere between the tracks or on either side. The track is 175 ft. long and parallel to the water front. The hopper is fed by a 35-ton Byers crawler crane with a 1-yd. clamshell bucket, either from scow or stock pile. The conveyor has a 20-in. belt traveling at 450 ft. per minute and is capable of handling about 3 tons of sand or rock per minute. For the ordinary use at the plant, it carries the materials from the stock piles to the large storage bins but this procedure can be reversed so that sand may be conveyed from the stock piles to barges for delivery down channel to the Long Beach plant. This type of conveyor was designed by H. F. Murphy, general superintendent, and James Butler, chief mechanic, both of the Graham Bros. company and built entirely in the company's shops.



A portable conveyor, swiveled and mounted on broad-gage railway truck



View from far side of bins showing water-front location of traveling belt conveyor

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	Mar. 3	100	135	135	1¾% quar. 25% ex. Dec. 1
Alpha Portland Cement Co. (preferred)**	Mar. 2	100	114	....	1½% quar. Sept. 1
Arundel Corporation (sand and gravel—new stock)	Mar. 3	No par	31¾	32⅝	30c quar., 60c ex, Jan. 2
Atlas Portland Cement Co. (common)	Mar. 1	No par	49⅝	49⅝	50c quar.
Atlas Portland Cement Co. (preferred)	....	100	....	....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)**	Mar. 2	33⅛	44	47	2% quar. Oct. 1
Bessemer Limestone and Cement Co. (common)‡	Feb. 26	100	145	160	1½% quar. Jan. 1, 4% ex. Jan. 1
Bessemer Limestone and Cement Co. (preferred)‡	Feb. 26	100	106	108	1¾% quar. Jan. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	Feb. 26	....	120	130	8% annual
Boston Sand and Gravel Co. (common) (r)	Feb. 27	100	61	....	2% quar. July 1
Boston Sand and Gravel Co. (preferred) (d)	Jan. 15	....	....	80	1¾% quar. Oct. 1
Boston Sand and Gravel Co. (1st preferred) (d)	Jan. 15	....	....	90	2% quar. Oct. 1
Canada Cement Co., Ltd. (common)	Mar. 3	100	108¼	109	1½% quar. Jan. 16
Canada Cement Co., Ltd. (preferred) (f)	Feb. 26	100	115⅝	116	1¾% quar. Feb. 16
Canada Cement Co., Ltd. (1st 6's, 1929) (f)	Feb. 26	....	102½	103¼	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944) (f)	Feb. 26	100	93	96	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Mar. 1	No par	23	25	50c quar. Jan. 11
Charles Warner Co. (preferred)	Mar. 1	100	101	....	1¾% quar. Jan. 28
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929 (r)	Feb. 27	100	105	....	
Cleveland Stone Co.	Mar. 2	....	152	152⅛	1½% quar., Mar. 1, 1% ex. Mar. 1
Connecticut Quarries Co. (1st Mortgage 7% bonds) (s)	Feb. 26	100	104	105	
Dolese and Shepard Co. (crushed stone) (a)	Mar. 3	50	75	77	$1.50 quar. Jan. 1
Giant Portland Cement Co. (common)**	Mar. 1	50	40	45	
Giant Portland Cement Co. (preferred)**	Mar. 2	50	44	48	3½%s.-a. Dec. 15, plus 10% arrears.
Ideal Cement Co. (common)‖	Mar. 3	No par	80	85	$1 quar. Jan. 2. 50c ex. Dec. 27
Ideal Cement Co. (preferred)‖	Feb. 26	100	107	110	1¾% quar. Jan. 2
International Cement Corporation (common)	Mar. 3	No par	61⅛	61¼	$1 quar. Mar. 31
International Cement Corporation (preferred)**	Mar. 1	100	104	106	1¾% quar. Mar. 31
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Kelley Island Lime and Transport Co.	Mar. 2	100	120	124½	$2 quar. $2 ex. Jan. 2
Lawrence Portland Cement Co.**	Mar. 2	100	115	....	2% quar.
Lehigh Portland Cement Co.‖	Mar. 2	50	88	92	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially up to 1930) (k)	Feb. 26	100	99½	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially from 1930 to 1935) (k)	Feb. 26	100	98	100	
Michigan Limestone and Chemical Co. (common)‖	Feb. 26	....	24½	....	
Michigan Limestone and Chemical Co. (preferred)‖	Feb. 26	....	24½	....	1¾% quar. July 15
Missouri Portland Cement Co.	Mar. 3	25	60½	61	50c quar. Feb. 1
Monolith Portland Cement Co. (common) (c)	Feb. 11	....	9½	10	
Monolith Portland Cement Co. (units) (c)	Feb. 11	....	26	27½	
Monolith Portland Cement Co. (preferred) (c)	Feb. 11	....	8¼	8¾	
Newaygo Portland Cement Co.*	Feb. 26	....	125	....	
New England Lime Co. (Series A, preferred) (i)	Jan. 29	100	96½	99	
New England Lime Co. (Series B, preferred) (i)	Jan. 29	100	96½	99	
New England Lime Co. (V.T.C.) (i)	Jan. 29	....	23	25	
New England Lime Co. (6s, 1935) (m)	Mar. 1	100	99	100	
North American Cement Corp. 6½s 1940 (with warrants)	Mar. 2	....	99	99	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common) (z)	Feb. 27	....	94	99	2 mo. period at rate of 7%
North American Cement Corp. (preferred)	Dec. 31	....	....	....	1.75 quar. Feb. 1
Pacific Portland Cement Co., Consolidated (§)	Feb. 26	100	95	96	½% mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	Feb. 26	....	100¾	....	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Feb. 26	10	6	6⅜	
Petoskey Portland Cement Co.*	Feb. 26	10	10	....	1½% quar.
Rockland and Rockport Lime Corp. (1st preferred) (d)	Feb. 17	100	98	99	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred) (d)	Jan. 15	100	....	70	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common) (d)	Feb. 1	No par	....	60	1½% quar. Nov. 2
Sandusky Cement Co. (common)*	Mar. 2	100	132½	133	$2 quar. $3 ex. Dec. 31
Santa Cruz Portland Cement Co. (bonds) (§)	Feb. 26	....	104	....	6% annual
Santa Cruz Portland Cement Co. (common) (§)	Feb. 26	50	85	100	$1 quar. $1 ex. Dec. 24
Superior Portland Cement, Inc. (new stock) (6)	Feb. 26	....	44	44½	
United States Gypsum Co. (common)	Mar. 3	20	138½	143	2% quar. Mar. 31,
United States Gypsum Co. (preferred)	Mar. 3	100	115	118	1¾% quar. Mar. 31
Universal Gypsum Co. (common)†	Mar. 3	No par	17½	18½	
Universal Gypsum V. T. C.†	Mar. 3	No par	17	18	
Universal Gypsum Co. (preferred)†	Aug. 5	....	76	....	1¾% quar. Sept. 15
Universal Gypsum Co. (1st mortgage 7% bonds)†	Mar. 3	....	99	(at 6½%)	
Union Rock Co. (7% serial gold bonds) (y)	Feb. 15	100	99½	102	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940) (o)	Feb. 25	100	98½	100	
Wolverine Portland Cement Co.	Mar. 3	10	7	7½	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Willett, New York. †Quotations by True, Webber & Co., Chicago. ‡Quotations by Butler, Beadling & Co., Youngstown, Ohio. §Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York. (a) Quotations by F. M. Zeiler & Co., Chicago, Ill. (b) Quotations by De Fremery & Co., San Francisco, Calif. (c) Quotations by A. E. White Co., San Francisco, Calif. (d) Quotations by Lee, Higginson & Co., Boston, Mass. (f) Nesbitt, Thomson & Co., Montreal, Canada. (i) E. B. Merritt & Co., Inc., Bridgeport, Conn. (k) Peters Trust Co., Omaha, Neb. (m) Second Ward Securities Co., Milwaukee, Wis. (o) Central Trust Co. of Illinois, Chicago. (r) J. S. Wilson Jr. Co., Baltimore, Md. (s) Chas. W. Scranton & Co., New Haven, Conn. (y) Dean, Witter & Co., Los Angeles, Calif. (z) Hemphill, Noyes & Co., New York. (6) Quotations by Bond & Goodwin & Tucker, Inc., San Francisco.

QUOTATIONS ON INACTIVE ROCK PRODUCTS CORPORATION SECURITIES ON PAGE 62

Editorial Comment

Concrete Aggregates

More concrete aggregate producers should join the American Concrete Institute and take part in the efforts being made to increase our knowledge of concrete. It is presumed aggregate producers would be acceptable members of the Institute, which aims to include all who are interested in concrete and its development. The Institute would be the gainer by their membership both intellectually as well as financially, but most of all it would be an excellent education for the producers themselves. For more and more the live producer is beginning to speak the language of the user—architect, engineer and contractor—and to appreciate that the raw-material producer as well as the user has a vital interest in the finished product.

Non-Metals Recognized

A committee of prominent mining engineers was appointed some time ago by Secretary of Commerce Hoover to make recommendations for the reorganization of the U. S. Bureau of Mines, which is now a part of the Department of Commerce. It is gratifying to rock producers to note that the report of this committee, which has recently been made public, particularly emphasizes the importance of minerals of the non-metallic group. This group, of course, includes such tremendously important minerals as petroleum and coal, but leaving out these, the report states:

> Minerals of the non-metal group, excluding those used for fuels, now produced in the United States, exceed in value that of the metal output, and amount annually to three-quarters of a billion dollars or more. The total is made up of the output of many small mines, non-metallic mining being usually not organized with large producing units. In general, the industry corresounds rather to farming in that there are numerous shall producers selling their output locally and in many instances operations are intermittent. Indeed, a surprising amount of production comes from the farms, the mining being done by farm labor as out-of-season work.
>
> Non-metallic minerals used in industry are numerous and varied. They range from abrasives to soapstone. They vary greatly in characteristics and quality and are utilized in highly technical manufacturing industries regarding which the initial producer has little information. It is characteristic of this field that grading of output is rudimentary and much of the material, gathered in small lots, is sold through brokers. Continually new uses are being found and undoubtedly new sources of supply of better quality or better situated for production remain to be discovered and developed.
>
> The non-metals constitute the great reserve of the mineral wealth of the nation. Long after the forests and the iron, lead, zinc, and copper deposits prove inadequate, brick, stone, slate, gypsum, lime, sand, gravel, and many other of the non-metallic minerals will be available in abundance for structural and other uses. At the same time, even now, our great manufacturing interests are at times handicapped by the inadequacy of local supply of suitable quality of some little considered non-metallic mineral such as garnet or mica.
>
> For these various reasons there is in the non-metallic field a peculiar opportunity for usefulness in (a) research directed toward extending knowledge of the various minerals, and (b) collecting and redistributing such technical and economic knowledge as already exists. In the latter field especially the various trade journals and the trade associations that are coming into being are doing excellent work and in these as in other mineral industries there are individual producers and groups of producers who have well qualified and well directed technical staffs that need little outside help. This is not, however, true generally, and much good can as usual be done in bringing average performance, as nearly as may be, up to the best performance.

We believe the committee has over-estimated the importance of the "farmer-type" of producer. certainly so far as the commoner kinds of rock products are concerned. Our own intimate knowledge of the field, as well as the U. S. Census Reports, go to prove that 50% of so-called producers are responsible for about 95% of the total production of sand, gravel and stone.

Uniformity and Workability of Concrete

Apparently the two qualities of concrete most desired are uniformity in strength and density and workability under varying conditions and with various ingredients. Uniformity in strength and density can be materially helped by application of the water-cement ratio theory to practice, with the aid of a device such as an inundator, and uniform workability can be attained by proper grading of the aggregates or the use of more cement, more sand, lime, or celite. The inundator is a practical mechanical device, but workability introduces the personal equation and really means *workmanship*. Where it is most economical to apply workmanship—in the preparation of the aggregates or in the preparation of the concrete—is not yet settled; but it would seem from listening to the papers and discussions of the recent convention of the American Concrete Institute that poor concrete is just as often caused by faulty manipulation and workmanship of good aggregates as it is by poor aggregates.

All this has its bearing on the interests of the aggregate producer, because it costs more money to make good aggregates than it does to make poor aggregates, and the product obtained with good aggregates and poor workmanship may not be so reliable as that obtained with poor aggregates and good workmanship. The result is much more confusion as to the relative values of aggregates than needs to exist, if the producers of aggregate would take a more active interest in proving or disproving their own theories in regard to the advantages of good aggregates.

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Divided rate
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	....	12½	....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	....	70	....	
Sastern Brick Corp. (7% cu. pfd.) (1)	Dec. 9	10	40c	....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	....	
Edison Portland Cement Co. (common)	Nov. 3	50	7½c(x)	....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	....	
Lime and Stone Products Co. (1100 sh. pfd., $10 par and 700 sh. com., $10 par)	Feb. 10	....	$66 for the lot	....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	....	....	£1⅝	
Phosphate Mining Co. (1)	Nov. 25	....	1@5	....	
Pittsfield Lime and Stone Co. (preferred)	....	100	....	....	2% quar. Apr. 1
Simbroco Stone Co. (pfd.)	Dec. 12	....	....	....	$2 Jan. 1
Tidewater Portland Cement Co. (common) (3)	Nov. 25	....	8½	....	
Vermont Milling Products Co. (slate granules) 5 sh. pfd. and 1 sh. com. (2)	Dec. 30	....	$1 for the lot	....	
Winchester rick Co. (preferred) (sand lime brick) (5)	Dec. 16	....	10c	....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925.

Charles Warner Company Annual Statement

THE following is the condensed balance sheet and income statement as of December 31, 1925, of the Charles Warner Co. In his report to the stockholders, Charles Warner, president of the company, said:

"The demand for our commodities held up well throughout the year 1925. Building construction continued its active demand for all kinds of building materials. The agricultural demand for lime products showed steady improvement.

"The year was a particularly trying one in our sand and gravel operation, because of the tuning up of the new large central land plant erected during the preceding year.

Condensed Balance Sheet

DECEMBER 31, 1925

ASSETS

Cash	$ 75,661
Accounts receivable	361,057
Merchandise (cost)	250,324
Securities	341,771
Real estate, buildings, kilns, structures, equipment, motor trucks, horses, wagons, tugs, dredges, barges, and development	4,189,359
Miscellaneous and deferred	43,617
	$5,261,789

LIABILITIES

Accounts payable	$ 90,302
Bills payable	None
Accrued accounts, including common dividend payable January 11, 1926, preferred dividend payable January 28, 1926, and federal tax	130,012
Convertible gold bonds	402,000
First preferred stock	842,200
Second preferred stock	177,100
Common stock ($100 par value)	500
Common stock (no par value) 94,397 shares	2,757,347
Surplus, reserves, and undivided profits	862,328
	$5,261,789

GROSS SALES

	1923	1924	1925
Lime products	$1,260,618	$1,196,843	$1,277,112
Sand and gravel	1,087,874	1,315,293	1,685,442
Cement	188,929	158,975	150,772
Other bldg. material	187,486	170,609	167,383
Miscellaneous	29,112	96,202	46,785
	$2,754,019	$2,937,922	$3,327,494

Income Statement

FOR YEAR ENDED DECEMBER 31, 1925

Total earnings after deducting all expenses incident to operation, inclusive of general expenses, ordinary taxes, insurance, rentals, and maintenance		$688,116.79
Deduct—		
Net credit losses	$ 6,100.99	
Depreciation	214,205.00	
Depletion	58,271.67	
Net interest	37,343.60	
Allowance for federal tax	54,000.00	
		369,921.26
Balance to credit of surplus, available for dividends, etc.		318,195.53
Dividends paid to holders of first and second preferred stock		71,508.50
Balance available for distribution to com. stockholders or other purposes		$246,687.03

A plant of this size with a capacity of 10,000 tons daily, which requires the dredging of a new inland lake and the transportation of crude material to the finishing plant on the Delaware river shore with the subsequent processes of washing, sizing and crushing, takes some time and effort to bring to full and economical production. The year 1925 was devoted to this, and while the new plant was developing to full capacity the operation of our river dredging equipment had to be continued, causing a temporary high-cost condition.

"The enlarged Penn sand and gravel plant located on the Pennsylvania railroad between Bristol and Trenton, produced satisfactory results during the year and was of substantial assistance in furthering the growth of our sales of sand and gravel.

"The Warner company's lime plants produce a character of lime more generally used for building and agricultural purposes. Four years ago we were invited to undertake the management of the American Lime and Stone Co. of central Pennsylvania which produces lime principally for the chemical markets. The American company owns one of the largest deposits of very pure chemical limestone in the Eastern section of the United States. During 1925 we acquired a large block of American company shares, partly by cash and partly by exchange of Warner common stock, so that your company now owns over 61% of the common stock and 17% of the preferred stock of the American Lime and Stone Co. The common stock is the only voting stock, hence the control lies with the Warner company. The plants of the American company are being further enlarged and modernized and we believe in the years to come that this acquisition will be of substantial value to our company.

"During the year 1925 the bond issue of the company was reduced from $700,000 to $402,000, partly by sinking fund operations but mainly by conversion into common stock of the company. During the same period the outstanding no-par common stock increased from 79,775 shares to 94,397 shares, which was partly due to acquiring the controlling interest in the American Lime and Stone Co. but mainly due to the bond conversion operations.

"To further the friendly relations between the company and its employes the company has established both in its direct forces and throughout the organization of the American Lime and Stone Co., a group insurance policy providing payments amounting to from $500 to $1500 according to years of service, in case of death of any employe."

Giant Portland Earnings

THE figures below are the comparative earnings of the past three years ending December 31, 1925.

BALANCE SHEET DEC. 31

ASSETS

	1925	1924
Real est., bldgs. machinery, etc.	$2,906,666	$2,812,302
Cash	290,565	428,613
Notes and acc'ts rec.	85,839	68,567
Loaned on collat. demand notes	200,000	....
Sundry debtors	2,252	2,768
Rents and int. rec.	1,309	698
Inventories	360,436	354,237
Deferred charges	8,046	8,968
Fund for red. bds.	49,828	100,179
Stocks and mortgages owned	7,142	11,236
Total	$3,912,083	$3,787,570

LIABILITIES

	1925	1924
Preferred stock	$1,871,150	$1,871,150
Common stock	1,106,050	1,106,300
1st mtge. 6s	121,000	173,000
Accounts payable	95,962	47,816
Customers' credit balance	2,119	5,052
Payroll and unclaimed wages	19,488	16,439
Accr. int. and taxes	67,078	53,865
Res. for contingencies, etc.	18,902	19,318
Surplus	610,335	494,628
Total	$3,912,083	$3,787,570

GIANT PORTLAND COMPARATIVE EARNINGS

	1925	1924	1923
Net profit from oper., after prov. for deprec., local and state taxes	$536,498	$458,491	$438,566
Bank and other interest, rents, etc.	19,672	Cr12,046	Cr13,532
Total income	$556,170	$470,537	$452,098
Deduct—Interest on bonds	8,149	15,410	21,750
Federal income tax for year	63,929	49,461	24,179
Int. on mortgages and notes	....	221	1,986
Amt. written off Norfolk property	....	148,181	237,560
Loss on dismantling mach'y, etc.	50,289	....	....
Dividends paid	(17%)318,096	(14)261,892	(7)131,600
Balance, surplus	$115,706	def$4,629	$35,023

Dividends on the preferred stock outstanding at present are in arrears to the extent of 19%.

—*Financial Chronicle.*

Concrete Construction Industry's Largest Convention Typifies Progress

American Concrete Institute and Concrete Products Association Members to the Number of About 800 Meet in Chicago

THE largest convention of the American Concrete Institute ever assembled met in Chicago, February 23-26. The various papers and discussions will fill a large volume, and are of more particular interest to architects, engineers, contractors and builders in concrete, than to the producers and manufacturers of the cement and aggregates, which go to make up this now most important of all construction materials.

Predicts Industry Will Double in Next Twenty Years

In his opening address A. E. Lindau, president of the Institute, who spoke on "The Trend of the Institute Work," said that the concrete industry was a billion dollar industry at present, and at the rate it was growing would probably be double that in 20 years. The advantages of concrete in construction lay not only in the reduction of high cost of living through decrease in building costs but in the conservation of such natural materials as lumber, and the more efficient use of man power. The Institute had done much, he said, to promote and develop experimental work, and was planning an even more ambitious program along this line, which could succeed only by greater co-operation of the members. There was little doubt, he concluded, that the future would bring many new methods of designing concrete mixes and of newer uses to which concrete could be put.

Materials Not Always at Fault

An outstanding impression of the whole proceedings was that there still exists little really accurate knowledge of concrete, and that much that is known and recorded is not generally applied in practice. Nevertheless progress is constantly being made. It would have done many producers of cement and aggregates good to have listened to much of the discussion and heard the many admissions that manipulation and workmanship are far more often at fault than the materials.

Poor workmanship and shoddy methods were the chief causes of damage done in the Santa Barbara earthquake, according to Arthur T. Day, director of the Geophysical Laboratory, Washington, D. C.

Can There Be a Standard Portland Cement?

An interesting and more or less impromptu discussion as to whether standard portland cement was relatively uniform under ordinary or unusual conditions showed to what extent this had been studied. P. H. BATES, of the U. S. Bureau of Standards, declared that there were really no "standard" cements, for they were heterogeneous masses of perhaps widely varied chemical analysis. With the aid of lantern slides Mr. Bates showed microscopic views of thin slices of cement clinker to bear out his point. This, he said, would account for the difference in properties exhibited by different "standard" portland cements.

S. C. HOLLISTER, consulting engineer, Philadelphia, read some figures and showed graphs obtained from tests made by him on the setting rate of different cements under different conditions of temperature. At temperatures around 70 deg. F. the time of set approximated each other but as the temperature decreased wide variations appeared, some setting at a much slower rate.

A. W. HUTCHINSON, of the Solvay Process Co., Detroit, said that the regular methods of testing cement were of little value. The reason for this was that it was necessary to consider the type of work in which the cement was to be used and the 28-day test was not quite complete for he had known of cements used in roads which in that period of time showed low strength yet at a later date developed strengths exceeding those of cements which met the 28-day requirements. The rate of hardening, he said, is the best test of all.

J. C. EVANS, of the Hugh L. Cooper Co., engineers, New York, urged that the cement manufacturers co-operate with the concrete construction men towards solving the problem of uniformity.

ERNEST ASHTON, chief chemist, Lehigh Portland Cement Co., Allentown, Penn., brought out that the cement companies were as much alive to the situation as the concrete construction men and stated that his company had recently made a mixture of brands of standard portland cements and sent samples for tests to 18 different laboratories. None of these laboratory reports checked with the other and in many cases variations of 100% were reported.

Early High Strength Cement Mixtures

On the question as to the best methods of obtaining early high strength with standard portland cements, DUFF A. ABRAMS, Lewis Institute, said that he had obtained a 3-day strength of from 1500 to 2500 lb., with a concrete mix, applying the water-cement ratio.

J. H. CHUBB of the Universal Portland Cement Co., then said that he had obtained a strength of 2800 lb. in 1 day on neat cement made by mixing 1 cu. ft. of cement with one gallon of water. On a mixture of 1 cu. ft. of cement to 1.7 gal. of water, he obtained 5400 lb. Further increases of water showed loss in strength. The following figures illustrate the water ratio test:

1-DAY COMPRESSIVE TESTS

Cement (cu. ft.)	Water (gals.)	lbs./sq. in.
1	1.0	2800
1	1.7	5400
1	2.0	4100
1	2.5	2500
1	2.9	2100
1	5.0	310

M. M. UPSON, consulting engineer, New York City, said that while Mr. Chubb's figures were all right they referred to only one brand of cement and that they probably could not be duplicated with another. His experience indicated as much as 400% difference in that respect with various brands. Caution was to be exercised in the excessive use of calcium chloride for hardening concrete; for it apparently had a tendency to corrode steel reinforcement bars.

On the use of retempered concrete, P. H. Bates said that under certain conditions it might be used but it was his opinion that it was best to be avoided. Duff A. Abrams said that better concrete results if the wet mix is held for ½ to 3 hr. with slight remixing and the concrete made in this manner shows an actual increase in strength. It is good for patches, etc., for the water is absorbed by the cement and aggregate and initial shrinkage begun so that the final shrinkage on setting is greatly reduced and increased cohesion results.

Uniform Strength of Concrete Attainable

Various speakers demonstrated that constant results could be obtained, even with necessarily variable materials, by proper manipulation and workmanship. Control of the water cement ratio by use of the inundation system of proportioning the aggregates is of proved merit in eliminating one of the most important variables.

JOHN G. AHLERS, of the Barney-Ahlers Construction Corp., New York City, a practical contractor, proved that it was not only entirely feasible to use the inundation method on city building jobs, but distinctly to the advantage of the contractor to do so, financially, as well as in securing concrete

of a uniform strength. Here are a few of the important variables in making concrete, according to Mr. Ahlers:

(a) Errors resulting from incorrectly balanced amounts of water and cement getting into successive batches—variation in water-cement ratio.
(b) Variation in moisture content in aggregate.
(c) Errors in assuming an average moisture content.
(d) Errors in moisture due to change in amount of aggregate used.
(e) Variations in test cylinders.
(f) Variations in cement.
(g) Change in chemical composition or intrusion of impurities in aggregate.
(h) Change in grading of aggregate.

Water Ratio More Important Than Grading

Perhaps one of the most interesting results of Mr. Ahlers' experience was the knowledge his organization acquired of various aggregates. He said: "It is possible to start with this information on any new job and select aggregates on a value basis, and judge them in view of this as to their relative costs." In other words he has found out that the cheapest aggregates are not necessarily the most economical.

Another very interesting (to aggregate producers) conclusion of Mr. Ahlers was: "The water ratio theory teaches that grading (of aggregates) has no effect on the strength of the concrete, so long as the resulting concrete is plastic and workable. Old customs resist new ideas, and traditions and prejudices are not always broken down by facts and figures. The truth of the theory will prevail in time, however, like all new and better things, even though slowly at first.

* * * * * *

"Change in grading was noticed to effect the plasticity at times but rarely enough to affect the workability. There was a definite demonstration that ready mix makes just as good concrete as separate sand and gravel—sometimes better and always cheaper. Resulting concrete specimens proved that when the water-ratio theory is followed the change in grading from batch to batch has no effect on the strength of the concrete as long as it was workable and plastic. The amount of aggregate added was changed at times to keep within the limits of plasticity but the resulting variation in strength was caused by the contained moisture change.

"The desirability of using sufficient sand was watched so as to keep the fineness modulus near to the maximum allowed by tables of the Lewis Institute. Where lack of fines was apparent or lack of any size of gravel, attempts were made to supply these, either by adding at the bins or directly into the mixer."

Specifications for Aggregates

A proposed tentative specification for aggregates, which will be submitted to the members of the Institute for adoption as a standard, defined fine aggregate as follows:

Fine aggregate shall consist of sand or other approved inert materials with similar characteristics, or a combination thereof, having clean, hard, strong, durable, uncoated grains and free from injurious amounts of dust, lumps, soft or flaky particles, shale, alkali, organic matter, loam, or other deleterious substances.

All fine aggregate shall be free from injurious organic impurities. Aggregates subjected to the color test for organic impurities and producing a color darker than the standard color shall be rejected unless subsequent mortar strength or concrete strength tests indicate them to be suitable for use.

Aggregates when subjected to the mortar strength test shall have a tensile or compressive strength at the age of 7 and 28 days of not less than 100% of that developed by mortar of the same proportions and consistency, made of the same cement and standard Ottawa sand.

Fine aggregates passing the ¼-in. sieve but otherwise failing to meet the requirements herein provided for grading, organic impurities or mortar strength, may be used provided the concrete proportions are so adjusted that, when tested in combination with the coarse aggregate to be used in the work, the crushing strength of the concrete at the end of 7 and 28 days will be at least equal to that of concrete of the same consistency made with the same cement and coarse aggregate in combination with a fine aggregate meeting all the requirements of these specifications and mixed in the proportions specified for the class of concrete under consideration.

Coarse aggregate was defined as follows:

Coarse aggregate shall consist of crushed stone, gravel, air-cooled blast-furnace slag, or other approved inert materials of similar characteristics, or combinations thereof, having clean, hard, strong, durable, uncoated particles, free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic, or other deleterious matter.

Coarse aggregate shall pass the test for soundness, except that aggregates which fail in the accelerated sodium sulphate soundness test may be used provided they will pass a satisfactory freezing and thawing test.

Grading specifications are left open in each case.

Hydrated Lime in Concrete

Two papers on the construction of the Wilson dam dealt more or less with the use of hydrated lime in concrete, to give workability. A paper by Paul C. Cunnick, director of laboratories, Rock Island Arsenal, Rock Island, Ill., on the "Effect of Lime on Concrete Products," was a distinct argument in favor of the use of hydrated lime. His conclusions were:

Absorption on One Face—The results obtained indicates that the total absorption into the exposed face is not increased by the use of lime.

Penetration of Dampness—The depth to which dampness penetrates a specimen can be easily observed when the water is applied to one face only. The depth of dampness penetration is decreased as the lime content is increased.

Permeability—The question of permeability is not touched in the standard absorption tests but in this impounding test the water flowing through a specimen can be both seen and measured. In the series thus tested, 60% of the units without lime were found to permit a measureable flow of water. The addition of 10% of lime resulted in 90% imperviousness. Out of 120 units tested, containing 20% or more of lime, only one leak was found. Permeability is apparently eliminated by 20% or more of lime.

Economics of Lime in Concrete Products—Any final discussion of the economics of this question is probably premature at this point in the investigation. The outstanding facts are that lime increases the strength of a product and improves other desirable properties. Increased strength can be utilized by obtaining a greater number of units per sack of cement when lime is used. These lime-cement units have certain advantages of appearance and water-tightness that make for greater marketability.

Further plant tests will be necessary in order to determine the relation of the cost of the lime to the value of the advantages arising from its use. However, several concrete product plants have started using lime as this investigation has been developing.

These conclusions were questioned by E. W. DIENHART, general manager of the Acme Concrete Products and Gravel Co., Cement City, Mich.

Concrete Pavement Discussion—Use of Calcium Chloride

In a paper on "Transverse Testing of Concrete," by H. F. CLEMMER and FRED BURGGRAF, of the Illinois State Highway Department, it was stated:

In Illinois two methods of accelerating hardening of concrete pavements have been used. These are (1) the use of calcium chloride applied to the surface of the slab as a curing agent or the incorporation of the material in the mix as an admixture, and (2) the use of "Lumnite" cement.

The use of calcium chloride applied on the surface as a curing agent has been found, from field tests made with a cantilever apparatus, to produce proper curing in half the time required by the old methods. However, when it is necessary to open a pavement to traffic as soon as possible or to pour concrete under low temperatures much more satisfactory results may be obtained with the use of calcium chloride as an admixture.

In order to carry on construction with accelerated curing it is necessary to have some method of test which can be easily used in the field to ascertain the strength of the concrete at increasing ages, to determine the intensity of the treatment necessary and finally to indicate when the slab is strong enough to carry traffic. It is particularly important to determine the increase in strength as different brands of cement respond in different degree to calcium chloride as an admixture. Therefore, the success of these methods depends entirely on the correct analysis of the problem in the field and subsequent checking by some accurate field test. For this purpose specimen beams are made in easily constructed forms of the same concrete used in the slab. These specimens are allowed to cure in the same manner as the slab and are broken at regular intervals in a testing machine, which for the most part may be constructed on the job.

Treatment of Subgrades

A paper on "Concrete Pavement Design," by L. W. TELLER and J. T. PAULS, U. S. Bureau of Public Roads, touched on the treatment of subgrades, in which both aggregate producers and cement and lime manufacturers are directly interested. It was stated:

Some of the treatments which have been used in the past for the improvement of bad subgrades are:

1. The use of granular materials as a layer immediately under the pavement.
2. The admixture of various materials with the subgrade soil.

* * * * * * *

Granular material added as a blanket or layer immediately under the pavement is being tried in a number of states, both as regular practice and as an experiment. There seems to be considerable virtue in the treatment, which is usually not unduly expensive and is not difficult to apply. This method needs careful design and supervision, however, as it is most important that thorough drainage be provided at all times for this porous layer. Otherwise, it will simply collect excessive mois-

ture and the bad condition will be further aggravated.

A number of attempts have been made to improve unstable subgrades through the admixture of various materials such as sand, portland cement and lime. These experiments have usually resulted beneficially, although somewhat costly and presenting construction difficulties. This treatment aims to so alter the material in the subgrade that it will have low volume change and good supporting power under existing moisture conditions.

Significant Tests for Concrete

A. T. GOLDBECK, chief, bureau of engineering, National Crushed Stone Association, pointed out the inadequacy of the compression test for concrete for all purposes. He said:

Stated in a general way, and eliminating special research, all tests made in connection with concrete are aimed at the final production of concrete suitable for given purposes. The purposes vary with the type of structure and the service which that structure must render. Before discussing concrete tests, it, therefore, will be necessary for us to have clearly in mind just what kind of resistance concrete should have, the general nature of the service it must render, and the desirable properties of concrete which will best perform that service. Then we shall be able to consider the tests suitable for evaluating those properties.

All of us, with a little patience, could catalog the many uses of concrete and most of us would be surprised at the length of our list. If we were to analyze each kind of structure from a service standpoint we should find that here the concrete is called upon for one kind of service, there for an entirely different kind and many structures would have service requirements in common. For instance, the main service of a protected column in a building is to resist constant or practically constant compression of a predetermined amount; a sea wall is called upon to resist the abrasive action of ice and water borne abrasives; the mechanical and chemical action of salts in solution; stresses due to wave action; alternate freezing and thawing, wetting and drying; temperature changes and static stresses. Culverts might have to withstand constant static loads, freezing, scour and surface abrasion and impact of traffic; pavements must resist direct tension, cross-bending, direct compression and shear, surface abrasion and the influence of moisture changes, freezing and thawing and impact of traffic—a very severe combination of stresses indeed. In other uses such as stucco the material might be almost independent of the influence of imposed loads but be called upon for high resistance to conditions of weather exposure, involving temperature and moisture changes and freezing. In still other structures resistance against alkali might be the most important consideration. Similarly, we might enumerate the kinds of service to be rendered by the concrete used in various structures. We would find in the end that concrete is called upon to have high resistance along certain well-defined lines as follows:

1. Compression
2. Tension
3. Cross-bending
4. Shear
5. Impact
6. Surface abrasion
7. Chemical action
8. Freezing

(1–8: Constantly applied or repeated)

9. Stresses from alternate wetting and drying
10. Absorption
11. Permeability
12. Heat resistance

In some structures only one of the above resistances would be important, in others, still another would govern, while it is not impossible that some structures might require high resistance along all of the above lines. With the knowledge that concrete might be called upon to have resistant properties in any one or all of these directions, it becomes pertinent for us to inquire what sort of tests we should actually employ to insure concrete of the necessary quality for the particular service it must render.

[Mr. Goldbeck described tests under each of the above heads. The following are of the most interest to aggregate producers.—Editor.]

* * * * * * * * *

Fire resistance is dependent on a number of factors. Thus, the character of both the fine and the coarse aggregate is very important and so also is the richness of the mix. Certainly fire resistance of concrete is a special property dependent on things other than compressive strength or any of the other tests thus far mentioned. Unless information already exists on the fire resistance of any particular aggregate which is being considered, it would be well to have special fire tests made on concrete containing that aggregate for the fire resistance of concrete can be judged in no other way.

It is a fact that our information on the effect of repeated stress in bending on concrete is far from complete notwithstanding the very excellent work of Dr. Hatt at Purdue University, of H. F. Clemmer at the Illinois Department of Public Works and Buildings, and by Dean A. N. Johnson of the University of Maryland, and the older tests in compression by J. L. Van Ornum at Washington University at St. Louis and H. C. Berry at the University of Pennsylvania.

How is resistance to repeated stress affected by the characteristics of the aggregate and the moisture condition of the specimen? Will repeated compressive stresses follow the same laws as repeated tensile or cross-bending stresses? Have we any reason to believe that the resistance of concrete against repeated stresses applied hundreds of thousands of times can be measured by its resistance against a single load applied once? At present we cannot answer these questions. In general, it seems to be the case that high quality concrete as measured by the compression test, tension or cross-bending shows high resistance to fatigue, and that probably is as definite a statement as should be made. More study should be given to repeated stresses, particularly as their effects are influenced by the aggregates and moisture condition and too much reliance should not be placed in static load tests made on specimens in a given moisture condition for determining the resistance of concrete to fatigue, especially when tested under an entirely different moisture condition.

No doubt other tests for special properties of concrete such as thermal conductivity, bond, consistency or workability and likewise tests for the constituent materials would be well worth discussing. But enough has been said to indicate the importance of giving very careful consideration to the service to which concrete will be subjected, for the service should determine the particular properties to be built into the concrete. Special properties in many cases require special tests, while in some cases the desired properties may be foretold by means of secondary tests more simply made than primary tests.

In a general way high resistance to compression is an indication of high quality concrete, but it is often necessary to have more exact information of the particular qualities of concrete intended for a given purpose than are shown by the compression test. In those cases tests should be made for the specific qualities desired.

Cement Products Producers Hold Annual Convention

Promotion and Selling Given Most Prominence

PROGRESS is being made in overcoming the handicap of unfavorable insurance ratings on concrete-block structures. This was one of the outstanding features at the annual convention of the Concrete Products Association in Chicago, February 25 and 26. Several of the various rating bureaus, which operate more or less in harmony with the National Board of Fire Underwriters, have already given concrete block the same rating as hollow clay tile, according to A. J. R. CURTIS, head of the cement products bureau of the Portland Cement Association. The results of fire tests by the National Board of Fire Underwriters and the United States Bureau of Standards are gradually being taken into consideration by the insurance rating bureaus as well as by the authors of city building codes, he said. He made a plea for more funds to continue the fire tests.

Blocks made of siliceous gravels will not pass the Fire Underwriters' tests. This was made clear by a representative of the Fire Underwriters' laboratories, Chicago. For a fee of about $50 the Fire Underwriters will inspect and test any cement products manufacturers' blocks, and if satisfactory the blocks may carry a Fire Underwriters' label, permitting their use in buildings under practically the same conditions as hollow claytile. The labels cost $2 per M and this price includes regular inspections of plant and product. Every block must be labeled. The label or tag is metal and is pressed into the green block.

From the consensus of the discussion it would appear that the majority of manufacturers considered this cost excessive, but none denied the advantage of the labeled blocks.

D. R. COLLINS, secretary, Wisconsin Concrete Products Association, spoke on "The Promotion Value of a Good Building Code."

A paper by JOHN POWERS, Sterling, Ill., on "Successful Sales Methods," laid stress on the value of advertising and selling of service continually to the contractor. He said that the live cement products manufacturer should take and read carefully the trade journals, Portland Cement Association literature, etc., and thus keep abreast with latest developments in his industry. Push, initiative and a fair price for his product would bring about the increased sales desired.

He was followed by C. B. MORRIS, who spoke briefly on the "Need of a Fair Return to the Railroads." C. O. GOCHNAUER, Appleton, Wis., then gave an interesting talk

on "Selling Materials for Factory Construction." He brought out the facts that a competent analyst's certificate on the strength of the cement block is about the best salesman, and it was something that the contractor, architect and factory owner would listen to. Build an honest block, he said, and tell the world about it and before long the business will come your way. Direct-by-mail advertising was shown to be a good way of interesting possible users of cement products. A good mailing list to be secured from the county tax list, a good printing job on a fair quality paper and an attractive layout was the best method of selling products by mail.

F. E. GUY, traffic manager of the Pittsburgh office, Universal Portland Cement Co., spoke on "Freight Rates on Concrete Products." He said that the railroads were often puzzled as to what the tariff should be on such products and generally they put them in the 6th class. Because cast trim stone was similar in their minds to cut stone they often gave it the same rate which was quite unfair. What was desired, he said, was to get a rate which would put cement block, tile, etc., on a basis with similar clay products. In several instances this had already been accomplished and they hoped to get the roads to adopt this everywhere.

In the discussion that followed this, LESLIE H. ALLEN, general manager of the Hawthorne Roofing Tile Co., Cicero, Ill., brought out that the railroads often took as a precedent for establishing rates, previous experiences in handling the product. For example, in one case that he knew of, poor packing of tile to be shipped had caused a large breakage in transit and consequent heavy claim settlement for it. When asked at a later shipment to fix a rate, the railroad took this experience into consideration and the tariff set was high. Thus because of one poorly packed shipment, rates were set at a high figure, for this and distance were the only bases on which roads had to work on.

Mr. Guy then said that it was the best practice to go to the traffic manager of the city in which the consignor's plant was located and let him get a rate, for in many instances this had worked out that the rate obtained was quite fair and absent from any undue prejudice or lack of precedent for a basis. It was agreed that the freight question was of utmost importance for the tendency in the industry was toward larger plants with an increased area over which shipments were to be made. President S. I. Crewe, then appointed Jacob Bosch, E. W. Dienhart and Leslie H. Allen as a special freight rate committee to investigate further into the possibilities of satisfactory adjudication.

At the business meeting the report of the nominating committee which involved chiefly a change in the by-laws permitting the increase of directors-at-large from 9 to 15 was accepted. The following officers and directors were then elected to serve in 1926:

Officers of Concrete Products Association, 1926

President, John Powers, Sterling, Ill.; first vice-president, S. I. Crew, Norwood, Ohio; second vice-president, Newton D. Benson, Providence, R. I.; secretary, D. R. Collins, Milwaukee, Wis.; treasurer, Jacob Bosch, Chicago, Ill.

Executive Committee.—John Powers, Austin Crabbs, D. R. Collins, George Saffert, A. G. Swanson.

Directors.—George Barriball, Cleveland, Ohio; Newton D. Benson, Providence, R. I.; Jacob Bosch, Chicago, Ill.; H. Buchholz, Oak Park, Ill.; D. R. Collins, Milwaukee, Wis.; Daniel Colmar, Albany, N. Y.; Austin Crabbs, Davenport, Iowa; J. A. Livingston, Toronto, Ont., Canada; W. F. Paddock, Seattle, Wash.; John Powers, Sterling, Ill.; George Saffert, New Ulm, Minn.; A. G. Swanson, Omaha, Neb.; S. I. Crew, Norwood, Ohio; E. W. Dienhart, Cement City, Mich.; C. O. Gochnauer, Appleton, Wis.

Northwest Concrete Products Association Holds Successful Convention

THE recently organized Northwest Concrete Products Association held their first annual convention at Longview, Wash., recently. The registration showed almost 100 present and included many representatives of cement products plants in Washington, Oregon, and Idaho.

The main speakers were David Williams, manager of Pioneer Sand and Gravel Co., Seattle, on "Concrete Materials and Pre-Mixed Concrete"; James Thompson of the United States Steel Products Co., Portland, on "Use of Reinforced Steel in Concrete Pipe"; William McKenzie of the Tuerck-McKenzie Co., Portland, on "Concrete Products Plant Machinery," and C. B. Nims, district engineer, Portland Cement Association, Portland, on "History of Cement Industry and Its Uses as Relating to Concrete Products."

General discussions were had on the manufacture and sale of concrete products and also on the benefits to be derived through co-operation of the members of the association. It was decided to make an aggressive campaign of advertising, publicity, and exploitation for cement products. Better quality was the keynote of the session, and several actions were taken looking toward a realization of this purpose. Action was also taken looking to closer affiliation with the National Association.

The following officers were elected for 1926:

W. F. Paddock, Seattle, Wash., president; W. H. Sharp, Longview, Wash., secretary-treasurer; Roy Ward, Portland, Ore., first vice-president; W. P. Hawes, Yakima, Wash., second vice-president, and E. V. Bull, Ontario, Ore., third vice-president. These officers also compose the executive committee.

Lime Manufacturers Hold Conference with Architects and Contractors

A VERY interesting and instructive conference on lime for construction purposes was held at the Palmer Hotel in Chicago, February 23, under the auspices of the central division of the National Lime Association. B. L. McNulty, president of the Marblehead Lime Co., Chicago, chairman of the central division, presided, and G. B. Arthur, general manager, and R. P. Brown, director of publicity of the Washington office of the association, were present.

Besides representatives of nearly all the lime manufacturers in the central district, there were present as invited guests a large number of architects, contractors, builders, and a few representatives of the building trades magazines. The session lasted from about 2 p.m. to 11 p.m., with a dinner in between, at which the lime manufacturers were hosts.

The subjects of formal papers and the authors were as follows: "Lime Mortar," John D. Moore; "Lime in Concrete Products," J. S. Elwell; "Lime Stucco," L. E. Johnson; "Lime in Concrete," J. S. Elwell; "Lime in Plaster," K. J. Zinck.

Each of the authors is a member of the staff of the central division office at Chicago, except Mr. Johnson, who recently resigned to go with the Stewart Sand Co., Kansas City. Following each paper was a general discussion of the subject, during which much interesting information was developed.

Port Crescent Sand and Fuel Company Making Extensive Plant Additions

MAX B. McKEE, president and general manager of the Port Crescent Sand and Fuel Co., has informed us about the additions his company is making to the plant at Port Crescent, Mich. This plant, a description of which was published in ROCK PRODUCTS, June 27 issue, has an unusual system of handling and loading bank run sand. Almost a mile of belt conveyors are used for these operations. In addition to the conveyors already in use there is to be installed a new 350-ft. traveling field conveyor unit which will operate on the side opposite the 1500-ft. stationary field conveyor unit installed last year and described in the issue noted above.

The company is also installing a large screening unit, using a battery of six Bonnot piano wire screens which are fed from a bin overhead by six Stephens-Adamson belt feeders.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Mixed Concrete as a Cement Product

Pioneer Sand & Gravel Co., Seattle, Wash., Provides Additional Market for Its Sand and Gravel

THE Pioneer Sand and Gravel Co. not only produces and sells sand and gravel but conducts a big building material business. It has a number of yards in the city, the largest and best equipped being on Spokane avenue in the southern part of the city. There is a large warehouse here for the storage of cement, there are stockpiles of various sizes of sand and gravel and there are six Blaw-Knox steel bins from which trucks are loaded for city delivery. A recent addition to this yard is a mixed concrete plant from which deliveries of wet, mixed concrete, ready to pour in the forms, are made as far as 14 miles from the plant.

H. F. Ostrander, the president of the Pioneer company, had more than the idea of making an additional market for his sand and gravel when he started this plant. He wanted especially to improve the quality of the concrete that is used in small jobs. Seattle is by no means free from the competition of the wayside pit in the districts surrounding the city where the building code is relaxed and it also has the usual number of small contractors who have only the slightest knowledge of concrete proportioning. The consequence is that, as in all other cities, a considerable amount of inferior concrete is poured. To replace this with good concrete is not only a good thing for the building industry but for the public at large.

The plant was designed and built by one of the company's engineers and is rather a model of compactness. The frame, about 50 ft. high, is of structural steel well braced. At the top is a 75-ton bin divided into four compartments. One holds 2-in. and finer gravel, the second 1½-in. and finer gravel, the third coarse sand and the fourth fine sand. By drawing from these any mixture of sizes may be made.

Mixed concrete plant of the Pioneer Sand and Gravel Co. The inundator and batcher are below the hopper and the mixer on the floor below that. Cement in sacks is on the shelf projecting from the left

The bin is loaded by a Link-Belt locomotive crane electrically driven. The same crane lifts the sacks of cement, which are first piled on a board platform to a shelf below the hopper.

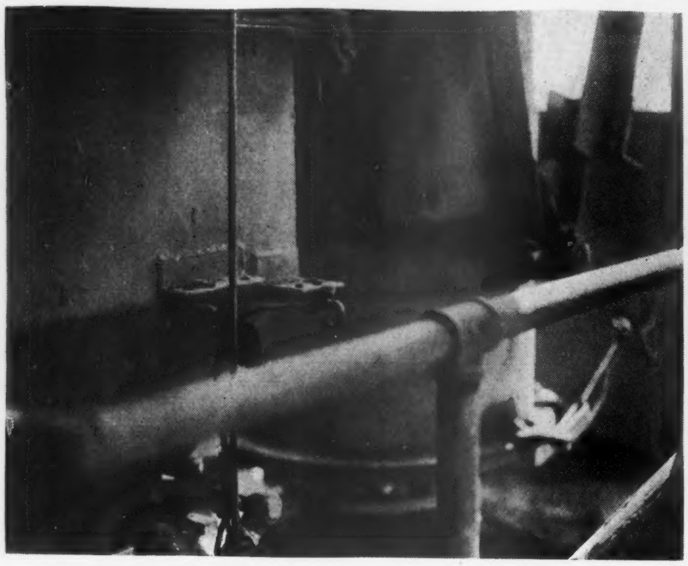
Underneath the hopper are the measuring devices, a Blaw-Knox batch measurer for gravel and an inundator of the same make for the sand. The measuring device for gravel was originally adjusted by threaded rods and nuts, but these have been taken off and wire ropes substituted. The ropes each go to a small windlass and by taking up or slacking off on these ropes the volume may be adjusted much more quickly than was possible with the rods.

The inundator is a device which is becoming pretty well known now. Its advantage is that it measures the sand in a saturated condition and avoids any changes in the weight of a given volume due to "bulking."

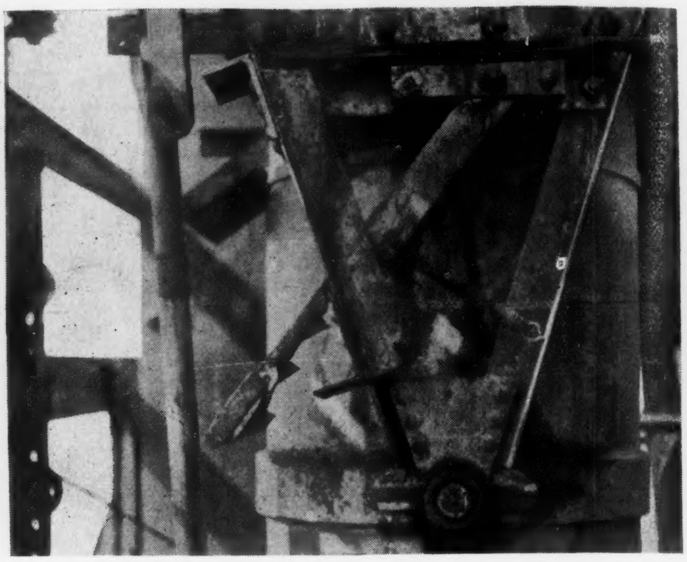
The batcher and the inundator discharge into a small hopper and run down a spout into the mixer. This is a Koehring mixer holding 29 cu. ft. Cement is added by the sack and if part of a sack is needed this is weighed out and not measured or guessed at.

The concrete is tested for slump. For paving work it is mixed for a 2-in. slump and for other work a 4-in. slump.

Delivery is made in special hopper trucks which hold a yard of mixed concrete. No difficulty has been experienced in getting the concrete to the job in good shape, and the service is growing in favor. The plant has its own books and a clerk keeps account of sales and materials in a small office beside the batcher



Batcher (left) and inundator below hopper. The wire rope is one that is used to regulate the volume of the batcher



Inundator used to assure a constant weight of sand in the mix by measuring sand in saturated condition

and inundator at the mixing plant.

Specifications Govern Prices

Price cards are issued to everyone interested. The prices are based on two sets of specifications, that of the building department which figures a barrel of cement at 4 cu. ft. and that of the engineering department which figures a barrel at 3½ cu. ft. Naturally, the engineering department specification concrete costs a little more. The prices are:

PRICES AT PLANT

CONCRETE MIX

Mix	Specification Bldg. Dept.	Specification Eng. Dept.
1:2:3	$7.45	$8.05
1:2:3½	7.15	7.70
1:2:4	6.80	7.40
1:2½:5	6.20	6.75
1:3:4	6.40	6.95
1:3:5	6.05	6.60
1:3:6	5.80	6.30
1:3:7	5.60	6.05
1:5:9	5.20	5.40

These are standard mixes, but any other mix of either concrete or grout is made on request. For delivery (in addition to the plant price) a fixed price is set.

GROUT

Mix	Specification Bldg. Dept.	Specification Eng. Dept.
1:1	$15.50	$17.45
1:1½	13.15	14.80
1:2	11.55	13.00
1:3	9.70	10.80
i:4	8.75	9.25

DELIVERY PRICES

Within 1 mile per cu. yd.	$0.75
From 1 to 2 miles per cu. yd.	1.00
From 2 to 3 miles per cu. yd.	1.20
From 3 to 4 miles per cu. yd.	1.40
From 4 to 4 miles per cu. yd.	1.55

Over 5 miles the charge is $1.55 plus 20 cents per yd. per mile.

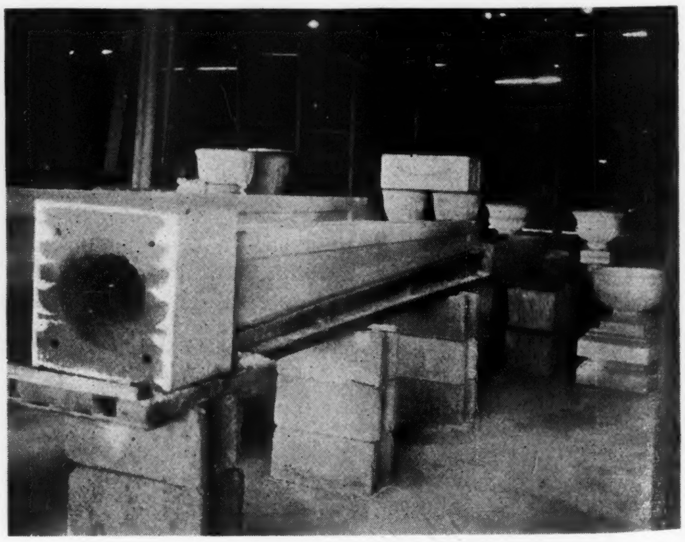
Ornamental Objects in the Cement Products Field

THE Omaha Concrete Stone Co. operates a plant in the northern part of Omaha, Neb., which makes a variety of products. Its main output is of concrete blocks of which it produces 5000 daily. But it also makes brick, special blocks for chimneys, lamp standards and a variety of ornamental pieces, and it does concrete work outside of the factory by contract.

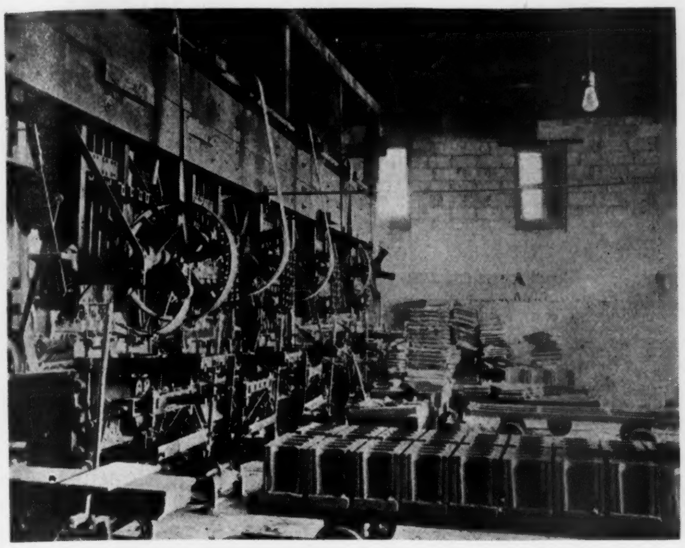
In the factory there are eight Ideal machines and five Blystone mixers. The aggregate is received in a hopper above the mixers and measured into them. Lyman-Richey sand-gravel having a fineness modulus around 4.00 is the aggregate mainly used, but some blocks are made of sand and cinders and some of "haydite," or burned shale. These blocks are to supply a demand for lighter weight units than the regular concrete block.

Recently experiments have been made with

Fireplace made of concrete brick on display in the sample room

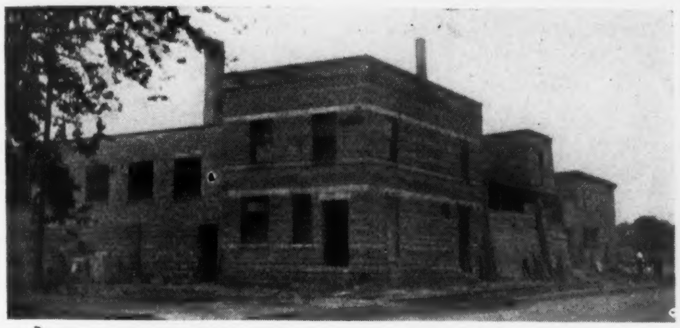


Lamp posts and garden ornaments in the shop

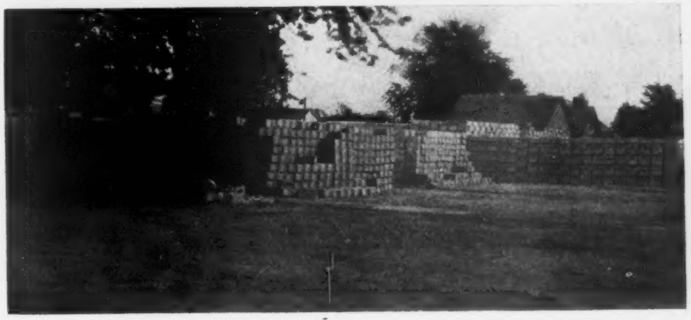


Battery of block-making machines used at the plant

Trim stone curing in the yard



Cement block factory of the Omaha Concrete Stone Co.



A section of the curing yard of the Omaha Concrete Stone Co.

sand and gravel to find the mixture that would use the least cement for the required strength in blocks and these have resulted in the furnishing of a special aggregate by the sand and gravel company. The block weighs about 2 lb. more than formerly but the increase in weight is wholly in the aggregate.

The curing of the blocks is by the usual method of holding from 24 to 36 hr. in the steam rooms and then trucking to the yard where curing goes on for two weeks or more.

Trim stone and ornamental forms are molded in the usual way by hand, sand-gravel being used as aggregate. This concern makes a good many of the concrete lamp posts that are used by the city.

The offices and sample room are housed in a building made of brick of the company's manufacture. The outside brick are of a dark red color but are faced with crushed rock that contains mica which has a very pretty effect in the sunlight.

The company is incorporated and V. A. Johnson is president, A. G. Swanson is secretary and treasurer and C. P. Forsell is superintendent in charge of the work.

Cinder Block Merger Advanced

THE merger of cinder block producers involving seventy-six plants was recently advanced through the election of directors for the Building Units Patent Corp., all stock in which is owned by the National Concrete Products Corp. Announcement of plans and companies entering this merger was published in the February 20 issue of ROCK PRODUCTS. The officials are Charles R. Flint, New York, industrial organizer; Wade Millis, Detroit; Alfred Owen Crozier, Drury N. Cooper, Leroy A. Goodwin, E. B. Caldwell, Francis J. Straub, Sigrud B. and Paul M. Fogel of Kansas City.—*New York (N. Y.) Times.*

Absorption of Concrete Block

EDITOR, ROCK PRODUCTS: In your issue of December 12, I note in an article headed "Concrete Building Units on the West Coast," with a sub-title "Climate and Building Codes Have Caused the Development of the Poured Tile," the following statement: "The part played by the building code was that of forbidding the use of block or tile which would absorb more than 10% by weight of water. The ordinary tamped or pressed block will absorb considerably more; the poured tile considerably less."

The above statement does not agree with the findings of the Portland Cement Association in their laboratry at Lewis Institute. There thousands of experiments have proven that the tamped block comes nearer the ideal condition of greatest strength and lowest absorption than any poured block possible could. Water ratio is becoming more important in concrete than the cement ratio. In fact, they have proved in the laboratory that with sloppy concrete sometimes used from ⅔ to ¾ of the strength of cement is lost.

You can judge the part the building code plays in keeping the tamped block out of Wisconsin when we have in our association 57 members whose product are approved by the state, and all but one of these make a tamped block. Take in our own case. Our blocks have been tested for the past six years. Our lowest test was an average of 3.43% for three blocks and our average for all tests is under 5%, all blocks tested being taken from stock.

C. O. GOCHNAUER, *President,*
Wisconsin Concrete Products Ass'n.

Iowa Concrete Products Association Elects Officers

HERMAN E. MEIER of Davenport, secretary and manager of the Northwest Davenport Cement Block Co., was elected president of the Iowa Concrete Products Association in the election held near the close of the recent annual convention at the Hotel Blackhawk, Davenport.

Floyd Goodrich of Waterloo was chosen vice-president and Ross Dowell, Des Moines, secretary-treasurer.

Dewey Portland Cement Company to Build Plant in Iowa

ACCORDING to a recent announcement in the Davenport (Iowa) *Democrat,* the Dewey Portland Cement Co., Kansas City, Mo., is to erect a 1,000,000-bbl. cement plant near Davenport. The company is reported to have purchased 215 acres of land near Linwood, Iowa, on which the plant is to be built. This has been confirmed in a letter to Rock Products by F. E. Tyler, president of the Dewey company, who also states that they have actually started the work on the new plant and will proceed as fast as conditions and weather allow them. It is expected that the production of cement will begin at the new mill by January, 1927. Mr. Tyler also said that much of the ground site has been owned by the company since 1916 and is situated on the Mississippi river, three miles west of Davenport.

It is said that the capital for the new plant, $3,000,000, comes entirely from the Dewey company. The new plant will use the wet process of manufacture and waste heat boilers will be installed. The contract for the engineering work has been let to the J. C. Buckbee Co., Chicago, who will also supervise the building of the plant, installation of machinery, etc.

The Dewey Portland Cement Co. has owned and operated a 1,500,000-bbl. cement plant at Dewey, Okla., for the past 16 years. This plant ships principally to neighboring states. The new plant is expected to find market for its product in Iowa, Illinois, Wisconsin, Minnesota, Nebraska, and the Dakotas.

Two New Cement Plants to Be Erected in Pacific Northwest

ACCORDING to the Seattle (Wash.) News, plans for the erection of two cement plants in Washington have been almost completed. The recently organized Northwestern Portland Cement Co. is one of the new companies to enter into the production of cement, and the other is the Washington Cement Co., Seattle, Wash.

The Northwestern Portland Cement Co. has filed articles of incorporation at Olympia, Wash., for a capitalization of $2,000,000. The plant, which is to be erected at Grotto on the Skykomish river, is to have a capacity of 750,000 bbl. per year. F. T. Crowe, a director of the company, in outlining the plans, stated:

"We have purchased what is known as the John Maloney and associates limestone deposits which lie at an elevation of about 1000 ft. above Grotto. These deposits, according to a survey and tests, show a high calcium rock. We shall probably do the preliminary crushing at the quarry and transport the crushed rock down to the plant by train. The plant will adjoin the Great Northern railway tracks. Nearby are deposits of clay which we have obtained for use in manufacturing.

"Construction of the $1,000,000 mill will begin as soon as plans now being drafted are completed. It is hoped to have it in operation within eight or nine months. Our mill will use the wet process of making cement and will be modern in every respect. We probably shall use electric power for operation, and we shall have our choice of oil or coal for fuel. We shall use whichever is cheapest. Everett will be our tidewater shipping point as it is only 50 miles from the plant."

The men interested in this project have long been connected with the cement manufacturing industry and include F. T. Crowe, president of F. T. Crowe & Co., Seattle and Tacoma, building material dealers; G. MacDonald, vice-president and general manager of the Sun Portland Cement Co., Portland, Ore., and C. T. W. Hollister, secretary and sales manager of the Sun Portland Cement Co. These men are all directors in the new company. Mr. MacDonald was formerly with the Vancouver Portland Cement Co. at Victoria, B. C. Later he was connected with the Oregon Portland Cement Co. until he organized the Sun Portland Cement Co. about two years ago.

Mr. Hollister was formerly with the Ideal Portland Cement Co. of Colorado and later with the Oregon Portland Cement Co. until he left to join MacDonald in the organization of the Sun Portland Cement Co.

Organizers of the Washington Cement Co. are Phillips Morrison, with offices in the Leary building; Arthur G. Smith, and F. R. Bates, the latter two with offices in the Burke building. It is capitalized at $10,000. Plans call for an expenditure of $2,000,000 on plant, crushing and quarrying facilities, and the present capitalization of $10,000 is only for preliminary financing, Morrison declared. Smith and Bates were formerly manager and vice-president, respectively, of the Washington Portland Cement Co., which was organized in 1904 and developed a property at Concrete, Skagit county, which was sold to the Superior Portland Cement Co. in 1918.

The Washington Cement Co., said Morrison, proposes to construct a plant on common user tracks and at tidewater in Seattle and to start quarrying, the construction of a crusher and the building of a railroad spur at Denny Mountain, the source of raw material, as soon as preliminary engineering has been completed.

"We propose a 750,000-bbl.-per-year cement plant, using the wet process and coal for fuel will be obtained from mines adjacent to Seattle," Morrison stated. "Ours will be the only tidewater plant on the Pacific Coast directly in a primary market. Deliveries to Puget Sound points aside from Seattle can be made by vessel and inland points can be reached by rail. Seattle and contiguous territory will be served by truck.

"We have acquired high-grade limerock deposits at Denny Mountain, near Snoqualmie Pass, about 600 acres in extent.

He said the deposit is about 1000 ft. from the Sunset Highway and that a rail line will be constructed 6000 ft. to connect with the Chicago, Milwaukee and St. Paul railway by which the rock will be hauled to the Seattle plant after crushing at the quarry.

Surveys for this railroad, it was announced, have been made, and construction of the line and development of the quarry will begin as soon as the snow that now covers the ground goes off in the spring.

Construction of the Seattle plant, Mr. Morrison said, will begin as soon as the purchase of the site has been completed and will be finished, unless there are unforeseen delays in the program, early in 1927.

North American Cement Acquires Acme Cement

THE North American Cement Corp. has acquired the business and properties of the Acme Cement Corp., located on the tidewater near Catskill, N. Y. The present productive capacity of the Acme plant is 1,000,000 bbl. of cement per year which, it is planned, will be increased to 1,500,000 by the improvements now in progress, and which will make this plant one of the most modern in the Hudson river district. The combined capacity of the plants owned by the North American Cement Corp. is equivalent to 3,700,000 bbl. a year, and upon completion of the improvements now in progress, is expected to be increased to more than 4,500,000 bbl. per year.—*Rochester (N. Y.) Democrat and Chronicle.*

Ocala Portland Cement Sells Out to the Lehigh

ACCORDING to an announcement in the *Dixie Manufacturer,* the interests of Walter Elcock and others in the proposed Ocala Portland Cement Co., have been purchased by the Lehigh Portland Cement Co.

This company was being organized to build a plant in the vicinity of Ocala, Fla. These plans have been abandoned.

The Lehigh company, as announced in Rock Products' December 26 issue, is to build a plant near Ocala.

Claims Cement Plant Dust Ruined Apple Crop

CHARGING that dust from the plant of the North American Cement Corp., near Hagerstown, Md., had ruined his apple crop the past year, Dr. C. R. Scheller, a prominent physician and former county health officer, filed suit recently for $10,000 damages against the company.

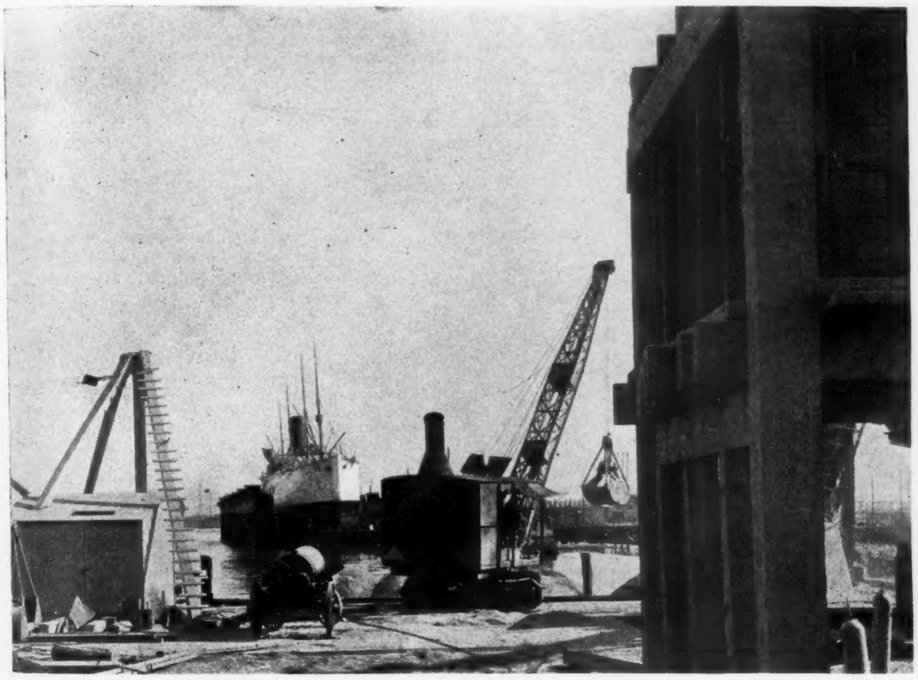
The suit alleges that the dust fell upon the fruit trees and other crops and that it played havoc with them. It is understood that the physician will introduce expert testimony and also the testimony of several other orchardists near the plant who declare their crops also have been damaged.—*Baltimore (Md.) Sun.*

Graham Brothers Opens New San Pedro Plant

THE fifth link of the large production and service chain of Graham Bros., Inc., Long Beach, Calif., producers of Catalina rock and Harbor City washed sand, was recently opened at San Pedro in the west end of the Los Angeles-Long Beach harbor. The West Basin plant, as it is called, has a capacity of 1000 tons per day. A fleet of 80 trucks is maintained to make deliveries within the territory.

The new West Basin plant of Graham Bros., Inc., has a 200 ft. water frontage and is situated on the west shore of West Basin at Berth 112, in the center of the "loop" formed by the convergence of San Pedro-Wilmington Boulevard, Harbor Boulevard, Gaffey Street and Pacific Avenue at San Pedro. The plant is so located that it can serve with direct plant deliveries the territory embracing the entire area west of the Long Beach city limits, through Wilmington, San Pedro, Palos Verdes Estates to Manhattan Beach on the west and northward through Harbor City, Lomita and Torrance to Gardena and Hawthorne on the north.

Approximately 5000 tons of crushed rock and washed sand will be kept on hand in storage as well as a sufficient quantity of disintegrated granite. It is planned to carry in storage at the plant 2500 tons of No. 3 rock, 2000 tons of No. 2 rock and 500 tons of washed sand. It is believed this amount of storage will provide a sufficient surplus to assure deliveries, but increased storage space is provided for, in the event business development demands additional rock and sand on hand.



View of location of new West Basin plant of Graham Bros., Inc., in the Los Angeles-Long Beach harbors

Part of three loading bins and of the 80 truck delivery fleet of the new West Basin plant

Mechanical equipment of the new West Basin plant includes a 35-ton Byers steam crane and 1-yd. clamshell bucket mounted on caterpillar base with an unloading capacity of 700 tons per day, and a belt conveyor capable of handling three tons of material per minute which is mounted on a track permitting a flexible radius at its base covering a 175-ft. traveling line. A description of this conveyor and its operation may be found on the Hints and Helps pages of this issue.

Three large loading bins give ample storage for loading all grades of material for immediate deliveries.

Plant locations of Graham Bros., Inc., are as follows: quarry, Catalina Island; Long Beach plant, Long Beach harbor; San Pedro and Wilmington plant, West Basin; washed sand plant, Harbor City; and Signal Hill plant at Signal Hill.

Experimental Lime Plant To Be Built at Woodville, Ohio

ARNOLD AND WEIGEL, contractors and engineers, are breaking ground for an experimental lime plant at Woodville, Ohio, which when completed will be a source of facts open to every lime concern.

This plant will be located on a piece of leased property belonging to the Bruns Hydrated Lime Co. It will be used solely for experimental purposes and its practicability will insure the most thorough and extensive tests.

The plant will be of fireproof construction, embracing steel and concrete. All the latest ideas and developments of machinery will be incorporated. A half-size "Arnold" standard coal-fired kiln will be installed, with which it is contemplated to try out different types of kiln linings and fire brick, together with various types of fire-box construction. With an arrangement of this kind it is said to be possible to try out any new suggestion on lime burning. The grinding, hydrating, finishing and testing equipment will be of the latest and modern design. Further details of the plant will be made known upon completion. The total cost is estimated at $20,000.—*Woodville (Ohio) News.*

Saticoy Rock Company Sold

THE sale of the controlling stock of the Saticoy Rock Co., Ventura, Calif., by A. G. Wright, also president of the Orange County Rock Co., was announced recently at a price said to be in excess of $100,000.

The company, with a plant ten miles east of Ventura, furnishes most of the rock for improvement projects throughout the county. —*Los Angeles (Calif.) Times.*

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning March 3:

Central Freight Association Docket

12491. Crushed stone and crushed stone screenings. Carloads, Bluffton, Ind., to points in Indiana and Ohio. Proposed rate: To C. I & W. R. R. stations, viz., Julietta, Ind., New Palestine, Ind., Reedville, Ind., Fountaintown, Ind., Morristown, Ind., Gwynneville, Ind., Arlington, Ind., Mauzy, Ind., Glenwood, Ind., Longwood, Ind., $1; Lyonsville, Ind., $1.05; Brownsville, Ind., Liberty, Ind., Cottage Grove, Ind., College Corner, Ind., Oxford, Ohio, $1.10; Woods, Ohio, McGonigle, Ohio, Belt Line Junction, Ohio, Hamilton, Ohio, $1.13. Present, sixth class.

12492. Crushed stone. Carloads, Greencastle and Bluffton, Ind., to Cincinnati, Ohio. Present rate, from Greencastle, Ind., via C. C. C. & St. L. Ry., 16 cents; via Pennsylvania R. R., $1.61 per net ton; from Bluffton, Ind., $1.13 per net ton.

12499. Crushed stone and crushed stone screenings. Carloads, Huntington, Ind., to points shown below. Proposed rates (per net ton) to Tiosa, Ind., Walnut, Ind., 85 cents; Argos, Ind., 90 cents; Plymouth, Ind., Tyner, Ind., 95 cents; Walkerton, Ind., Kankakee, Ill., $1; Stillwell, Ind., $1.05; LaPorte, Ind., Belfast, Ind., Michigan City, Ind., $1.10. Present rates, sixth class rates per Agent B. T. Jones' Tariff I. C. C. 937.

12504. Crushed stone. Carloads, Perkins Spur, Ind., to Idaville, Monticello and Reynolds, Ind., to Seafield, Wolcott and Remington, Ind. Present rates, 75 and 63 cents; proposed, 70 cents to Idaville, Monticello and Reynolds, Ind., and 60 cents per net ton to Seafield, Wolcott and Remington, Ind.

12505. Crushed stone. Carloads, Evansville, Ind. (when originating at points in Southeastern and Carolina territories), to Cedar Rapids, Iowa. Present, 23 cents; proposed, $3.18 per ton of 2000 lb.

12509. Feldspar and Cornwall stone. Carloads, minimum weight 50,000 lb., East Liverpool, Ohio, to Buffalo and Niagara Falls, N. Y. Present rate, 20 cents on feldspar and 22 cents on Cornwall stone; proposed, $2.70 per net ton.

12545. Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel. Carloads, Buffalo, N. Y., to Jamestown, N. Y. Present rate 13½ cents; proposed, $1 per net ton via N. Y. C. R. R.

12546. Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel. Carloads, Jonesville, Mich., to Angola, Ind. Present rate, 75 cents per net ton; proposed, 70 cents per net ton.

12547. Gravel and sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding and polishing, loam, molding and silica) also crushed stone. Carloads, Lake Cicott and Kenneth, Ind., to Mexico, Ind. Present rate, 70 cents per net ton; proposed, 65 cents per net ton.

12554. Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel. Carloads, Cayuga, Ind., to Westfield, Briscoe, Casey, Hazel Dell, Advance and Yale, Ill. Present rates, sixth class; proposed, 84 cents per net ton to Westfield, Briscoe and Casey, Ill., and $1.01 per net ton to Hazel Dell, Advance and Yale, Ill.

12564. Crushed stone, crushed stone screenings and tailings (other than ground or pulverized agricultural limestone, ground or pulverized limestone, fluxing stone or raw dolomite, fire stone and silica rock or silica stone). Carloads, Kokomo, Ind., to Archie, Hildreth, Gordon, Jessie, Hume, Hughes, Payne, Borton, Warrington, Kansas and Sidell, Ill. Present rates, sixth class; proposed, $1.15 per net ton to Archie, Hildreth, Gordon, Jessie, Hume, Hughes, Payne, Borton, Warrington and Kansas, Ill., and $1.20 per net ton to Sidell, Ill.

Southern Freight Association Docket

25267. Sand. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight shall govern, from Nashville, Tenn., to Columbia, Tenn. Present rate, 5 cents per 100 lb. ($1 per net ton); proposed, 4½ cents per 100 lb. (90 cents per net ton), same as current rate from Estill Springs, Tenn.

25275. Granite and stone taking same descriptions and carload minimum weight as applicable from Columbia, S. C., in So. Ry. Stone Tariff I. C. C. A9979, from Rock Hill and Winnsboro, S. C., to Eastern, Interior and Eastern, Buffalo-Pittsburgh, Ohio and Mississippi River crossings, Central Freight Association territory, Carolina and Southeastern points. No through rates in effect. It is proposed to publish same rates to points indicated above as in effect from Columbia, S. C., observing Charlotte rates as minima, published in So. Ry. tariff mentioned above.

25304. Stone, broken or crushed. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight shall govern. (b) Stone, agricultural (ground or pulverized limestone), carloads, minimum weight 60,000 lb.; from Sunlight, Ky., to Stovall, Oil City and Glasgow, Ky. Class rates now apply. Proposed, $2.10 per net ton. The proposed rate bears a proper relation to the existing rate from Hopkinsville, Ky., to the destinations involved.

25319. Sand. In bulk, carloads, minimum weight 90% of marked capacity of car, except that where cars are loaded to visible capacity actual weight will govern, from Junction City, Ga., to Jacksonville, Fla. Present rate, $2.40 per net ton. (Combination.) Proposed, $1.76 per net ton, based on proposed Georgia-Alabama scale less 10%.

25324. Limestone, ground. Carloads, minimum weight 90% of marked capacity of car, from Dolcito, Ala., to stations on the L. & N. R. R. south of Nashville, Tenn. Present rates: Commodity rates and Class "N" rates, as published in various local tariffs of the L. & N. R. R. applying from Dolcito, Ala., to L. & N. R. R. stations south of Nashville, Tenn. Proposed: Same as applicable between other Southern points. Statement of present and proposed rates to representative destinations will be furnished upon request.

25327. Limestone, ground. Carloads, minimum weight 90% of marked capacity of car, from Dolcito, Ala., to various Southern points. Present rates: Various through commodity rates and combination of class and commodity rates apply. Proposed: Same as applicable from other Southern producing points involving hauls of similar distances. Statement of proposed rates to representative destinations will be furnished upon request.

25338. Marble, rough quarried or sawed, hammered or chiseled, also sand rubbed or slushed. Carloads, minimum weight 60,000 lb., from Buena, Va., to Washington, D. C. Present rate, $3.01; proposed, $2.20 per net ton.

25337. Stone (including dolomite stone), crushed or broken. Carloads, minimum weight 95% of marked capacity of car, subject to a maximum of 10% in excess of marked capacity of car. Cars not loaded to their full carrying capacity to be charged for on basis of actual weight, subject to a minimum of 95% of marked capacity of car, from Pelham, Ala., to Alabama City, Ala. Present rate, $1.17; proposed, 80 cents per net ton, to apply only on traffic having origin, destination and entire transportation within the state of Alabama, and when consigned to and for the use of the following classes of industries, viz.: Steel plants converting raw materials, steel rod and wire mills, rolling mills, pig iron blast furnaces, cast iron pipe plants making larger water and gas mains. The proposed rate is based on the single line distance of the L. & N. R. R. applied to the mileage zone rates shown in Docket 11048 I. C. C. 564, advanced 25% under Ex Parte 74 and reduced 10% under Docket 13293.

25385. Sand and gravel. It is proposed to revise the present rates on sand (except glass and molding sand) and gravel (washed or unwashed). Carloads, minimum weight 90% of marked capacity of car except when cars are loaded to their visible capacity actual weight will govern, from Wilmington, N. C., to points on the A. C. L. R. R. S., A. L. Ry. So. Ry. and their subsidiary lines in South Carolina to reflect the carriers' submitted scale to the Georgia Commission. Rates on this basis are already in effect on interstate traffic between points in Carolina territory, and it is desired to reflect this basis from Wilmington, N. C. The proposed revision, generally speaking, results in increased rates, and statement of present and proposed rates to representative destinations will be furnished upon request.

25386. Feldspar. Carloads, minimum weight 50,000 lb. from Murphysboro, Ill., to Chattanooga, Tenn. Present rate, 45 cents per 100 lb. (Class "A" rate); proposed, 37 cents per 100 lb.

25399. Stone (including dolomite), crushed or broken. Carloads, minimum weight 95% of marked capacity of car, subject to a maximum of 10% in excess of marked capacity of car. Cars not loaded to their full carrying capacity to be charged for on basis of actual weight, subject to a minimum of 95% of marked capacity of car, from North Birmingham, Ala., to Gadsden, Ala. Present rate, $13.50 per car of 30,000 lb., or 90 cents per ton; proposed, 60 cents per net ton, same as rate in effect from Gate City and East Birmingham, Ala.

25422. Rock asphalt. Carloads, as described in I. C. R. R. Tariff I. C. C. 6928, from Big Clifty, Rockport and Summit, Ky., to Mobile, Ala. Present rate, $4.70; proposed, $3.27 per net ton, same as rate in effect from Bowling Green, Ky.

25434. Limestone. It is proposed to cancel the present commodity rate of $3.88 per net ton on limestone, ground, carloads, from Gordonsburg, Tenn., to Chicago, Ill., and points taking same rates as published in Agent Glenn's I. C. C. A498 account of no movement. Class rates to apply after cancellation.

Southwestern Freight Bureau Docket

7335. Sand, from points in Missouri to points in the Southwest. To establish the following rates on sand, chatt or crushed rock (asphalt coated), carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb., marked capacity will govern. From Carthage, Webb City, Carterville and Joplin, Mo., to stations in Arkansas, Louisiana (except points shown below). Oklahoma and Texas as described in S. W. L. Tariff 114A. Proposed basis: Establish a scale of single and joint line rates based 1 cent over the present sand and crushed stone scale as published in S. W. L. Tariff 114A. to Memphis, Tenn. Proposed basis: Same scale as indicated above, except that the Memphis bridge toll charge of 1 cent is to be added. To Vicksburg, Miss. Proposed basis, 2½ cents higher than rates applicable to Delta Pt., La., Natchez, Miss., 2½ cents higher than rates applicable to Vidalia, La. Baton Rouge, La., 2½ cents higher than rates applicable to Anchorage, La. New Orleans, La., 2½ cents higher than rates applicable to Gouldsboro or Algiers, La. Note: Above scale of rates to cancel present rates now published in individual and committee tariffs. The present rates locally in Arkansas are made 1 cent over the 9702 scale. Locally in Missouri they are made ½ cent over the 9702 scale. In view of the above it is felt that the proposed basis is reasonable.

7368. Asphalt rock, between Texas and Louisiana points. To establish rates on asphalt rock, carloads, minimum weight 50,000 lb. between Texas and Louisiana points in connection with Southern Pacific-Texas Lines as follows: Amend Item 1224 S. W. L. Tariff No. 8-F and Sixth Column Item 5365-P, Supplement 78 S. W. L. Tariff No. 21-R, by adding asphalt rock therein which will permit protection of combination rates on asphalt rock the same as now available on sand, gravel or crushed stone when moving in connection with the Southern Pacific lines. It is stated that there are frequent shipments of asphalt rock from Cline, Texas, and other producing points in Texas to various destinations in Louisiana to which there are no through rates in effect, the present class rate being considerably in excess of the combination, and it is contended that this asphalt rock is entitled to a rate not in excess of the crushed rock rate.

7378. Limestone from Harrys, Texas, to points in Louisiana. To establish the mileage scale of rates as shown in Item No. 6978-B of S. W. L. Tariff No. 8-F on ground limestone, carloads, minimum weight 50,000 lb., from Harrys, Texas, to points in Louisiana on the Southern Pacific lines. Shippers desire that the same scale be established to points on the Southern Pacific lines in Louisiana as has been approved for application to points on the K. C. S., Missouri Pacific, T. & P., etc.

Illinois Freight Association Docket

2922A. Slag, crushed. Carloads, minimum weight marked capacity of car, from Aurora, Ill., to Vandalia, Ill. Present, $3; proposed, $1.65.

3242A. Moulding sand. Carloads, minimum weight, 90% of marked capacity of car, from Sand Cut, Ill., to Hannibal, Mo., and Quincy, Ill. Present, combination rates; proposed, $1.77.

1257B. Sand. Carloads, proposal to amend Item 1175 of I. F. A. T. B. Tariff 108-K which provides for allowing rates by restricting same so

as to apply only on common sand. Per net ton: From Chicago, Ill., to Jackson, Miss., $4.60; to Jackson, Tenn., $3.40; to Memphis, Tenn., $3.70; to Meridian, Miss., $4.60; to New Orleans, La., $5, and points taking same rates; Vicksburg, Miss., $4.60.

Trunk Line Association Docket

13069. Slate, crushed or stone chips or granules, in packages or in bulk. Carloads, minimum weight 40,000 lb., from Estmont and Dutch Gap, Va., to Newport News, Va., 15½ cents per 100 lb. Reason: Rates fairly comparable with others for like distances.

13110. Gypsum, crushed, ground or rock. Carloads, minimum weight 54,000 lb., from Clarence Centre, N. Y., to Hudson, N. Y., 15½ cents per 100 lb. Reason: New plant is in operation at Clarence Centre, and it is proposed to establish rate on a basis comparable with others for similar distances in the same territory.

Western Trunk Line Docket

5142. Stone, crushed. Carloads, from East St. Louis, Ill., and Evansville, Ind., when originating at points in Southeastern and Carolina territories, to Cedar Rapids, Iowa. Present, from East St. Louis, $2.70; from Evansville, $4.60 per ton of 2000 lb. Proposed, from East St. Louis, $2.40; from Evansville, $3.18 per ton of 2000 lb. Minimum weight 90% of marked capacity of car.

5153. Limestone, ground. Carloads, from St. Louis, Mo., and other points of origin named in Item 2675B of W. T. L. Tariff 120C, I. C. C. A1468 to Ogden and Salt Lake City, Utah, and points taking same rates as named in same tariff. Present, Class E rates; proposed, establish same rates as are currently in effect on crushed and broken stone as named in Item 2675B W. T. L. 120C I. C. C. A1468. Minimum weight 90% of marked capacity of car, except that when actual weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will be the minimum weight. In no case shall the minimum weight be less than 40,000 lb.

5154. Limestone, ground. Carloads, from Mosher and Ste. Genevieve, Mo., to Missouri River points and points in Kansas and Nebraska. Present, combination rates; proposed, to Atchison, Kan., Kansas City, Mo.-Kan., Leavenworth, Kan., and St. Joseph, Mo., 14½ cents per 100 lb.; to Omaha, Neb., and Council Bluffs, Iowa, 16½ cents per 100 lb.; to points west of the Missouri River, same rates as currently in effect on lime, carloads, from St. Louis, Mo., as published in W. T. L. Tariff 78C I. C. C. A1370. Minimum weight 90% of marked capacity of car, but not less than 60,000 lb.

2051R. Stone, crushed. Carloads, from Jasper and Quartzite, Minn., to Battle Creek, Iowa. Present, $2.07 per net ton; proposed, $1.70 per net ton. Minimum weight 90% of marked capacity of car, except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply, but in no case shall the minimum weight be less than 50,000 lb.

3545L. Sand and gravel. Carloads, from Bonner Springs, Choteau, Edwardsville, Fairfax district, Forest Lake, Frisbie, Grinter, Holliday, Morris, Muncie, Sirridge, Sunflower, Turner, Wilder, Woodsan Spur, Kan., and other sand loading tracks in the Kansas City, Mo.-Kan., switching district, to Kansas City, Mo.-Kan., for industrial and team track deliveries. Present—Item 10, W. T. L. Tariff 156N authorizes use of combination rule; proposed—To cancel. Present—Item 20 covers application of rates at intermediate stations reading as follows: "At directly intermediate sidings or stations to or from which rates are not provided herein located between two points of origin or destination named herein, rates shown to or from the next more distant station will apply." Proposed, to correct to read as follows: "From directly intermediate sidings or stations from which rates are not provided herein located between two points or origin named herein, rates from the next more distant siding or station will apply."

3726B. Gypsum rock. Carloads, from Ft. Dodge, Iowa, to Cape Girardeau, Mo. Present, 23 cents per 100 lb.; proposed, 17 cents per 100 lb. Minimum weight 40,000 lb.

Imported Cement Case Dismissed

THE Interstate Commerce Commission, by division No. 4, has dismissed No. 16824, Woodhead Lumber Co. vs. Pacific Electric Railway Co., mimeographed, on a finding that the charges assessed on imported cement, carloads, from San Pedro, to Los Angeles, Calif., shipped in November, 1923, were applicable and not unreasonable. A question was raised as to the jurisdiction of the commission. It came to the conclusion that the shipment was a part of foreign commerce and that therefore within its jurisdiction.

The cement was received at East San Pedro and a rate of 7.5 cents was collected. The cement was unloaded from an ocean ship faster than the defendant could handle it so some of the shipment was stored at San Pedro from which point a rate of 6 cents applied when the cement was received from an ocean carrier.

So far as the record showed, the report said the complainant had no place of business at either San Pedro or East San Pedro and that all the cement was intended to be shipped to it at Los Angeles; in other words, the intention was that its transportation should end not at San Pedro but that a further movement to a particular point beyond San Pedro was intended to follow the water transportation. That intention, it said, was carried out as to these shipments, and also, apparently, as to the remainder of the consignment. In the circumstances, continued the report, it appeared that the foreign character of the commerce was not destroyed by the temporary storage of the shipments at San Pedro. The report said the record was not full in that respect but that from what there was of it, the commission was inclined to the view that the shipments were import traffic. The charge of unreasonableness, the report said, appeared to be based on the fact that the weight was not based on an estimated weight of 95 lb. to the bag. The complainant said cement was packed in standard bags containing 95 lb. but the commission said there was no definite showing that this cement was so packed and that foreign cement was packed so as to weigh from 95 to 105 lb.—*Traffic World.*

Agricultural Limestone Freight Rates

A FINDING of unreasonableness and an award of reparation have been made in No. 15948, Dolese Brothers Co. vs. Chicago, Rock Island & Pacific et al., mimeographed, as to the applicable rates on agricultural limestone from Buffalo, Iowa, to destinations in Illinois on the Burlington. The Interstate Commerce Commission, by division No. 3, found that the applicable rates to Oliver, Ill., were unreasonable to the extent they exceeded $1.03 per net ton. It found that the applicable rates to the other destinations in Illinois were unreasonable, on and after July 1, 1922, to the extent they exceeded the subsequently established specific joint commodity rates on limestone having value for purpose of soil treatment only, from and to the same points, and that between August 5, 1921, and June 30, 1922, the applicable rates were unreasonable to the extent they exceeded rates computed by dividing the subsequently established rates by ninety-one hundredths. It awarded reparation to that basis.—*Traffic World.*

Commodity Rate Set

THE New York State Commission recently took up with interested carriers the rates on sand and gravel, carload, from Star Brick, Penn., to Jamestown, N. Y., there being no commodity rates in effect and class rate of 11½ cents applied. Word has been received that the carriers have reduced these rates to $1.25 per ton on sand and gravel other than blast, engine, foundry, glass, molding or silica and $1.40 per net ton on sand blast, engine, foundry, glass, molding or silica. These rates are now in effect.—*Jamestown (N. Y.) Post.*

New Weight Schedule for Sand and Gravel in Nebraska

BECAUSE of the protests of the railroads and disagreements between the sand producers over a recent schedule of weights for sand and gravel to be used where it was not available to weigh loaded cars, the Nebraska State Railway Commission has withdrawn the old measurement and adopted a new one.

Under the old plan the cubic contents were to be ascertained in yards and for each cubic yard of sand 2,900 lb. was assigned and on gravel 3000 lb. A new classification is now made, and the following measurement and weights apply: Blow sand, 2600 lb. per cu. yd.; pit sand, 2900 lb.; sand gravel, 3000 lb.; gravel, 2800 lb.—*Sioux City (Iowa) Tribune.*

Alabama Gravel Rates Questioned

THE Birmingham (Ala.) Traffic Association has recently filed with the Interstate Commerce Commission intervening petitions in various complaints filed by the gravel interests of Montgomery, Ala., and Chattanooga, Tenn.

These complaints involve sand and gravel rates to a large portion of Southern Territory and bring into issue the relationship that should exist between these two commodities and crushed stone and slag from the Birmingham district, it is stated. The traffic association is known to represent a large number of firms engaged in the production and shipment of crushed stone and slag as well as sand and gravel, and arrangements are being made to defend properly the interests of Birmingham at the hearing which is scheduled for an early hearing at Atlanta, Ga., before Commissioner Lewis. of the Interstate Commerce Commission.—*Birmingham (Ala.) News.*

Oregon Points Get Reduction in Cement Rates

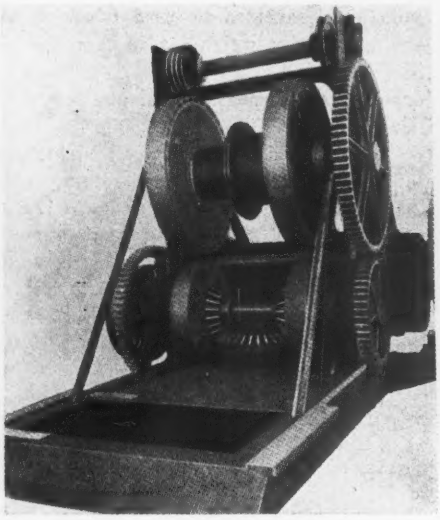
THE Oregon Public Service Commission recently authorized a reduction from 21¾ to 21 cents a 100 pounds on cement shipped from Lime, Ore., to Astoria, Ore. The new rate applies to carload lots.—*Portland (Ore.) Oregonian.*

New Machinery and Equipment

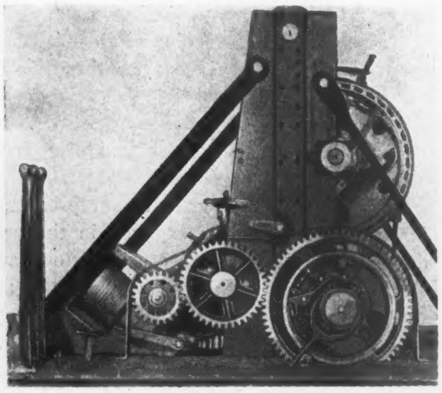
New Gas Shovel

A NEW gasoline shovel, Model 75, has been recently developed by the Thew Shovel Co., Lorain, Ohio. The makers claim for this new model lightness, compactness, strength and increased power. It is also said that it has sufficient stability for shovel service with dipper of 1¼-yd. capacity and crane booms up to 50 ft. in length.

The Model 75 is mounted upon a truck with crawler treads. Center drive is employed, the three operating shafts being

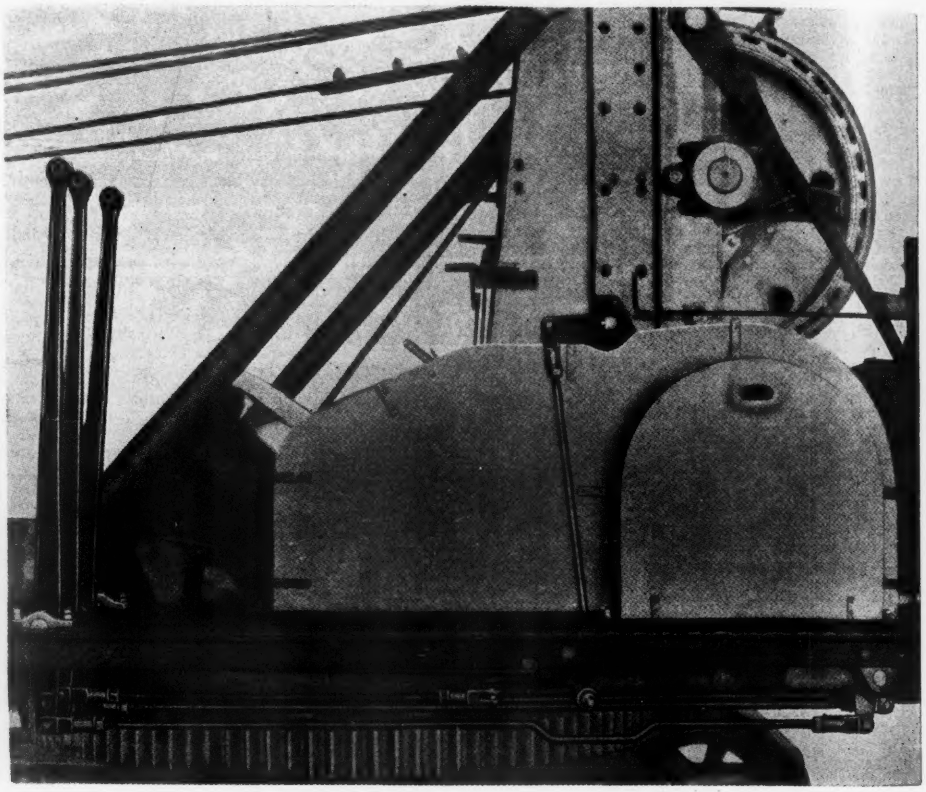


Rear view of shovel showing machinery frame and operating shafts

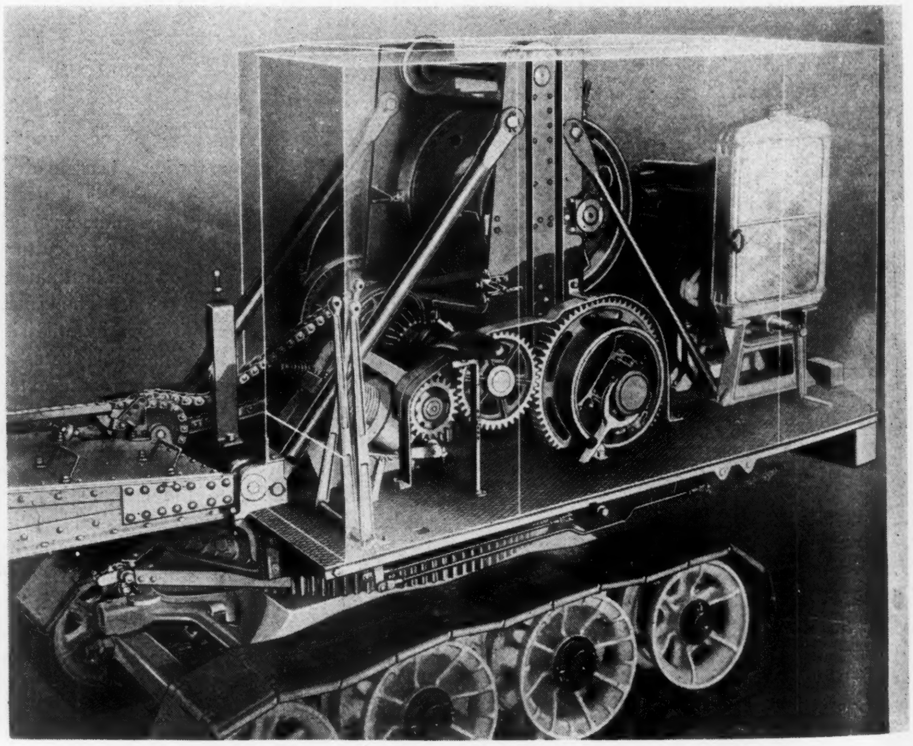


Side view showing gears for reversing crowd and travel motions and boom hoist drive

driven by one center pinion connected to the motor shaft by a silent chain. It is claimed by this center drive principle, the power, the load, and all of the strains and wear is distributed in three directions so that each of the three shafts transmits only a minimum of power. Other features claimed are reversible crowd and travel shaft, equipped with an automatic brake,

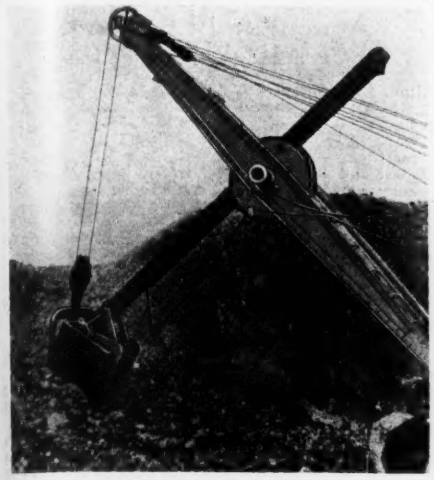


View showing three-lever control used for speed changes and for crowd, travel, and boom hoist motion

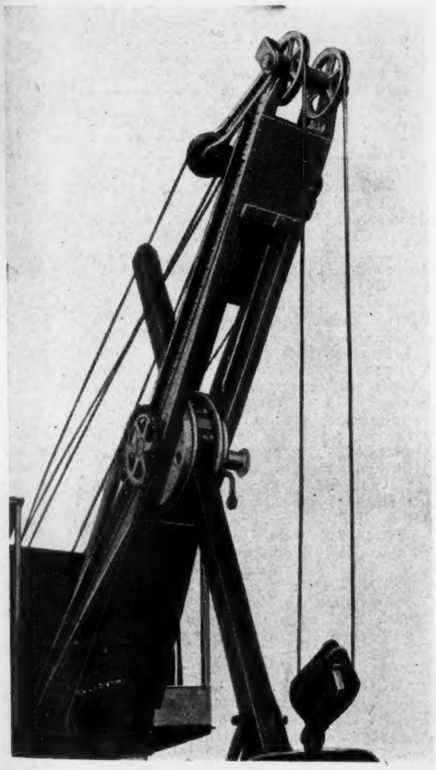


View showing operating mechanism of new gas shovel

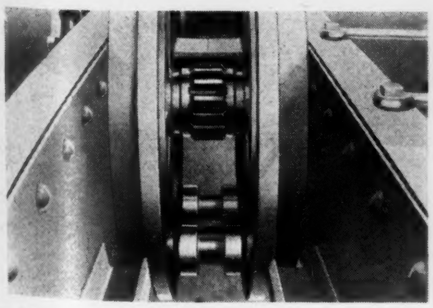
reversible worm driven boom hoist, simple and sturdy construction of the boom, and three-lever control, said to assure ease of operation. The cast steel turntable rotates on six conical rollers, four of which are in front mounted in pairs in equalizer carriages. These rollers are removable from the upper side of the turntable. Power is obtained from a 75-hp. Buda or Waukesha engine. It is said that in the case electric drive is desired a 40-h.p. motor is sufficient.



Boom and dipper stick



Details of control of boom and dipper stick

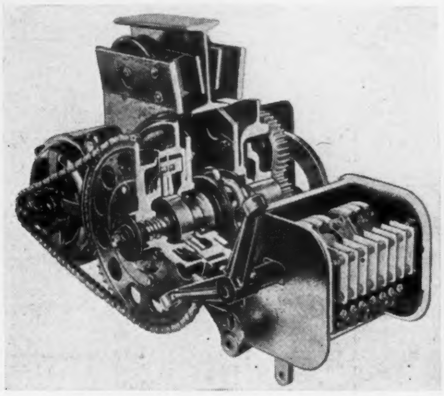


View showing roller carriage, shipper shaft and crowd pinion

Ball Bearing Electric Chain Hoist

THE Yale & Towne Mfg. Co., Stamford, Conn., has recently developed a new ball bearing electric chain hoist known as model 20B.

It embodies such features as close headroom, long lift, higher speed, automatic top and bottom limit stops and greater over-all strength. This hoist is said to have very unusual factors of safety in the strength of the load-supporting members and is designed to withstand shock loads so common in this class of equipment. All suspension members of the hoist are made of the highest quality steel.



Ball-bearing electric chain hoist

The hoist can be adapted to any overhead system, for the side plates of the trolley carriage can be spared to fit the desired beam flange.

The mechanism is fully enclosed in oil-tight chambers and is compact and easily accessible for inspection. The ball bearing load sheave, the latest Yale development, is said to be a big factor for low current consumption and general all-around hoisting efficiency. The ball bearings are of chrome vanadium steel and the load sheave of one piece heavy steel bronze bushed for the driving pinion. Splash lubrication is used for oiling all gears, pinions and bearings.

The driving pinion that passes through the load sheave is machined from a single drop forging, then heat treated. The bearing surfaces on the shaft are ground to 1/1000 of an inch.

Steel chain containers can be furnished to hold any length of slack chain up to 60 ft. for ¼, ½ and 1-ton hoists and 30 ft. for the 2-ton hoist. These containers are secured to the under frame of the hoist and do not affect the headroom.

New Screening Grizzly

A NEW type of grizzly screen, originally intended for coal operations, is said to be easily adapted for use in the crushed stone field. This machine, called the Frederick "Separator," is made by the Frederick Iron and Steel Co., Frederick, Md. The makers say that excellent results have been obtained in the separation of crushed limestone.

The picture shows the separator assembled on the floor. In operation it is placed on approximately 20-deg. pitch. The rolls are, for usual work, 4 in. in diameter and all rotate in the same direction at about 300 r.p.m. Arrangement is made for spacing rolls to get any desired sizing of the material. For abrasive materials, such as coke, slag, or stone, the rolls have white iron renewable sleeves to insure maximum service.

The Frederick "Separator" is built in a variety of sizes to suit tonnage requirements. The largest size so far built is 6 ft. in width by 10 ft. long. This size has a capacity of 300 tons per hour with rolls set to remove 1¼-in. size. Power required depends on capacity but as an indication of power consumption the larger machines are said to require only 5 h.p.

Grizzly screen for crushed stone separation

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.15	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.65	1.65	1.40	1.40	1.40
Cobleskill, N. Y.	1.50	1.35	1.25	1.25	1.25	.....
Eastern Pennsylvania	1.35	1.35	1.35	1.35	1.35	1.35
Frederick, Md.	.50	.75	1.30	1.20	1.10	1.10
Munns, N. Y.	1.00	1.50	1.50	1.50	1.25	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Walford, Penn.	.80	1.35h	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Afton, Mich.	.....	.....	.50	.....	.....	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Bloomville, Middlepoint, Dunkirk Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.10	.....	1.30	1.10	1.15	1.15
Chasco, Ill.	1.25	.....	.....	.....	.....	1.15
Columbia, Krause, Valmeyer, Ill.	1.00@1.50	1.20@1.25	1.20@1.25	1.20	1.20	1.50
			Flux all at 1.30			
Cypress, Ill.	1.15	1.15	1.15	1.15	1.05	1.00
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.10	1.10	.95	.95	.95
Milltown, Ind.	.....	.90@1.00	.75@ .85	.90@1.00	.85@ .90	.85
Northern New Jersey	1.30	.....	1.80	1.60	1.40	.....
River Rouge, Mich.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.75	1.25	1.05	.95	.90	.90
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Stone City, Iowa	.75	.....	1.10†	1.05	1.00	.....
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
SOUTHERN:						
Allgood, Ala.		Crusher run, fines out, for flux, 1.00 per net ton				
Cartersville, Ga.	.....	1.50@1.65	1.25@1.50	1.15	1.10	.....
Chico, Texas	1.00	1.40	1.35	1.25	1.20	1.15
El Paso, Tex.	.75	1.00	1.00	1.00	1.00	.....
Ft. Springs, W. Va.	.50	1.60	1.50	1.35	1.25	.....
Graystone, Ala.		Crusher run fluxing stone, 1.00 per net ton				
Henderson, N. C.	.....	.....	1.50	.....	1.25	.....
New Braunfels, Texas	.50@ .60	1.00@1.20	1.00@1.20	.80@1.00	.75@ .90	.75@ .90
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atkinson, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.90
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.10	.....
Kansas City, Mo.	.75	1.65	1.65	1.65	1.65	1.65
Limestone, Wash.	3.00	3.00	3.00	3.00	3.00	3.00
Rock Hill, St. Louis county, Mo.	1.20	1.35	1.35	1.35	1.35	1.35

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	2.00	1.55	1.45	1.25	1.25
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.70e	2.20	2.00	1.60	1.60	.....
Oakland and El Cerritto, Cal.	1.00	1.00	1.00	.90	.90	.....
San Diego, Calif.	.65@ .75	1.70@1.90	1.50@1.70	1.30@1.50	1.20@1.40	.....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	1.80	2.25	2.25	1.80	1.80	1.80
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite	.....	.....	1.75	.....	1.50	.....
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Havelock, Ontario	.....	2.60	2.10	2.10	.....	.....
Lithonia, Ga.—Granite	.75a	2.00	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	.....
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Pa. (sand-rock)	1.85@2.00a	.....	1.35@1.50	.....	1.00@1.50	.....
Toccoa, Ga.—Granite	.....	.....	1.60	1.45	1.40	.....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ½ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh		6.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk		2.75
Belfast and Rockland, Me. (rail), Lincolnville, Me. (water), analysis $CaCO_3$ 90.04%; $MgCO_3$ 1.5%, 100% thru 14 mesh, bags		4.50
Bulk		3.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)		5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh		1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized		2.50
50% thru 50 mesh		2.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk		2.50
Chico, Tex.—⅛ in. down		1.50
200 mesh		10.00
Colton, Calif.—Analysis 90% $CaCO_3$, bulk		4.00
Cypress, Ill.—90% thru 100 mesh		1.35
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk		3.25
Henderson, N. C. (paving dust)—80% thru 200 mesh, bags	4.25@	4.75
Bulk	3.00@	3.50
Analysis $CaCO_3$, 56%; $MgCO_3$, 42%; 65% thru 200 mesh, bags		3.95
Bulk		2.70
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked		5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk		2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk		2.70
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk		3.50
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton		2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@	4.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@	1.60
Olive Hill, Ky.—50% thru 50 mesh, 2.00; 90% thru 4 mesh		1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@	2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk		3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk		5.50
Rocky Point, Va.—Analysis 99.5% $CaCO_3$, 0.25% $MgCO_3$; 50% thru 200 mesh; bags, 3.25@3.50; bulk		2.00
Toledo, Ohio, 30% through 50 mesh		2.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh		2.10
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk		2.50

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh		3.00
Atlas, Ky.—Analysis over 90% $CaCO_3$; 90% thru 4 mesh	1.00@	2.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh		1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh		1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh		.75
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh		1.75
50% thru 4 mesh		1.50
Chasco, Ill.—50% thru 100 mesh		1.20
Chico, Texas—50% thru 50 mesh; bulk		1.50

(Continued on next page)

Agricultural Limestone

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh		.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh		1.35
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh		1.35
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh		1.50
Garnet, Okla.—All sizes		**1.25**
Gary, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh		.90
Kansas City, Mo.—50% thru 50 mesh		.75
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh		2.00
Screenings (¼ in. to dust)		1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk		1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@	2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh		1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh		1.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh		1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh		1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@	1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh		.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes		**1.25**
Waukesha, Wis.—90% thru 4 mesh		1.65

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk		3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@	3.50
Rocky Point, Va.—80% thru 200 mesh; bags, 4.25@4.75; bulk	3.00@	3.50
Waukesha, Wis.—90% thru 100 mesh, bulk		4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W. Va.—Glass sand		2.25
Cedarville and S. Vineland, N. J.—		
Damp		1.75
Dry		2.25
Cheshire, Mass.:		
6.00 to 7.00 per ton; bbl		2.50
Columbus, Ohio	1.25@	1.50
Estill Springs and Sewanee, Tenn		1.50
Franklin, Penn.		**2.25**
Gray Summit and Klondike, Mo		2.00
Los Angeles, Calif.—Washed		5.00
Mapleton Depot, Penn	2.00@	2.25
Massillon, Ohio		3.00
Mineral Ridge and Ohlton, Ohio		2.50
Oceanside, Calif.		3.00
Ottawa, Ill. (Contracts)		1.00
Pittsburgh, Penn.—Dry		4.00
Damp		3.00
Red Wing, Minn.:		
Bank run		1.50
Ridgway, Penn.	2.00@	2.50
Rockwood, Mich.	2.75@	3.25
Round Top, Md.		2.25
San Francisco, Calif.	4.00@	5.00
St. Louis, Mo		2.00
Sewanee, Tenn.		1.50
Thayers, Penn.		2.50
Utica, Ill.		1.00
Zanesville, Ohio		2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	1.75	1.50
Columbus, Ohio		.30@ .90
Eau Claire, Wis.	4.25	
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00*		1.50*	1.75*	
Farmingdale, N. J.	.58	.48	.75	1.20	1.10	
Hartford, Conn.	.65*					
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias Jct., N. Y.		.75	.75		.75	.75
Montoursville, Pa.	1.35	1.00	.90	.85	.75	.75
Northern New Jersey	.50	.50	1.25	1.25	1.25	
Olean, N. Y.		.75	.75	.75	.75	.75
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Pa.		1.85@2.00		1.35@1.50		
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis. (f)		.50		.75	.75	.75
Boston, Mass.‡	1.50	1.50	2.50		2.50	2.50
Chicago, Ill.	.70	.50	.50	.60	.60	.60
Columbus, Ohio		.70	.70	.70	.70	
Des Moines, Iowa	.40	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.50	.50	.95	.95	.95	.95
Elgin, Ill.		.20*	.50*	1.50*	1.50*	1.50*
Elkhart Lake, Wis.	.60	.50	.50	.60	.50	.40
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Haven, Mich.		.40@ .80		.60@1.00		
Grand Rapids, Mich.		.50		.80		.90
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50		.70	.70	.60
Humboldt, Iowa		.85	2.00	2.00	2.00	
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.		.50		1.35	1.35	1.35
Mattoon, Ill.	.75	.75	.75	.75	.75	.75
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.70	.70			1.60	
Oregon City, Ore.		1.25	1.25	1.25	1.25	1.25
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.65	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.25	1.10	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.		.40@ .70	.30@ .50	.50@ .60	.60	.60
Zanesville, Ohio		.70	.50		.80	
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.		All gravel, 1.50.		
Chattanooga, Tenn.		1.45			1.20	1.20
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Lindsay, Texas					.55	
Macon, Ga.	.50	.50		1.00	1.00	1.00
New Martinsville, W. Va.	1.00	.90@1.00		1.20@1.30		.80@ .90
Roseland, La.	.35	.25	2.25	.75	.75	2.00
WESTERN:						
Kansas City, Mo.	.80	.70				
Los Angeles, Calif. (points all around) (d)	.60	.50	.85	.85	.85	.85
Los Angeles district (bunkers)†	1.50	1.40	1.85	1.85	1.85	1.85
Phoenix, Ariz.	1.25*	1.00*	2.50*	2.00*@2.25*	1.75*	1.50*
Pueblo, Colo.	.80	.65		1.35		1.20
San Diego, Calif.	.65@ .75	.65@ .75	1.50@1.60	1.20@1.40		1.00@1.20
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Chicago, Ill.	.95					
Des Moines, Iowa	.50					
Dudley, Ky. (crushed silica)	1.10	1.10		.90		
East Hartford, Conn.			Sand, .75*			
Elkhart Lake, Wis.	.50					
Ferrysburg, Mich.						.65@1.00
Gainesville, Texas		.95				.55
Grand Rapids, Mich.	50	.50		.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.50		
Indianapolis, Ind.		Mixed gravel for concrete work, at .65				
Lindsay, Texas	1.30					[illegible]
Macon, Ga.	.40					
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronto and Yorkville, Ill.			Ave. .60 per ton all sizes			
Roseland, La.	.60					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	[illegible]
Summit Grove, Ind.	.50	.50	.50	.50	.50	[illegible]
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00				

(a) ¾ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run. (f) plus 15c winter loading charge.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.	....	....	....	.30@ .35	....	....	....
Albany, N. Y.	2.75	2.75	2.75	1.00@2.75	....	1.50@4.00	....
Arenzville, Ill.	1.50@1.75	....	....	1.00	....	....	....
Beach City, Ohio	1.75@2.25	1.75@2.25	....	1.50@2.00	2.00@2.50	....	1.75
Columbus, Ohio	2.00@2.50	1.50@2.50	2.00@3.00	.20@ .30	2.50	3.50@4.50	1.50@2.00
Eau Claire, Wis.	....	....	....	....	....	3.00	3.00
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Elnora, N. Y.	....	....	1.75	....	....	....	....
Estill Springs and Sewanee, Tenn.	1.25	....	....	1.25	....	1.35@1.50	....
Franklin, Penn.	1.75	1.75	2.00	2.00	2.00	....	....
Gray Summit and Klondike, Mo.	1.75	1.75	2.00	2.00	1.00	....	.85@1.00
Joliet, Ill.	No. 2 molding sand; loam for luting and open hearth work—.65@.85						
Kasota, Minn.	....	....	....	....	....	....	1.00@1.25
Mapleton Depot, Penn.	2.00	2.00	....	....	....	2.00	....
Massillon, Ohio	2.50	2.50	....	2.50	2.50	....	....
Michigan City, Ind.	....	....	....	.15@ .30	....	....	....
Mineral Ridge and Ohlton, Ohio	1.75*	1.75*	....	2.50	1.75*	1.75*	....
Montoursville, P'n.	....	....	....	1.25@1.40	....	....	....
New Lexington, O.	2.00	1.50	....	....	....	....	....
Ottawa, Ill.	....	.75@1.00†	....	....	....	....	....
Red Wing, Minn.	1.25	....	1.25	1.50	1.50	3.50	1.50
Ridgeway, Penn.	1.50	1.50	....	2.00@2.50	....	....	....
Round Top, Md.	....	....	....	1.60	....	2.25	....
San Francisco, Calif.	3.50	4.75	3.50	3.50@5.00	3.50@4.50	3.50@5.00	....
Tamalco, Ill.	....	1.50@1.75	....	....	....	....	....
Tamms, Ill.	Ground silica per ton in carloads—20.00@31.00						
Thayers, Penn.	1.25	1.25	....	2.00	....	....	....
Utica, Ill.	1.00	.60@1.00	1.25	.60@1.00	.60@1.00	....	1.00
Utica, Penn.	1.75	1.75	....	2.00	....	....	....
Warwick, Ohio	1.75*@2.25	1.75*	....	1.75*@2.25	....	....	....
Zanesville, Ohio	2.00‡	1.50‡	2.00‡	....	2.00	....	....

*Damp. †Crude silica, not washed or dried. ‡Plus 75c per ton for winter loading.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium nd Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	....	1.25	....	....	....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.45*	1.80*	1.45*	....	1.45*	....
Jackson, Ohio	....	1.05*	....	1.30*	1.30*	1.30*	1.30*
Toledo, Ohio	1.50	1.25	1.50	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	....	1.55*	....	1.55*	1.55*	1.55*	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	....	.80	....	1.25	.90@1.05	.90	....

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	....	....	12.00	....	....	....	....	2.20
Buffalo, N. Y.	....	....	....	12.00	....	....	....	....
Chazy, N. Y.	12.50	10.50	8.00	12.00	11.50	16.50	10.00	2.50_2
Lime Ridge, Penn.	....	....	....	....	....	....	5.00a	....
West Stockbridge, Mass.	12.00	10.00	5.60	....	....	....	....	2.00t
Williamsport, Penn.	....	....	10.00	....	....	....	6.00	....
York, Penn.	....	9.50	9.50	10.50	....	....	8.00	1.65i
CENTRAL:								
Afton, Mich.	....	....	....	....	8.50	1.61	....	....
Carey, Ohio	12.50	8.50@9.50	9.50	....	9.50	....	9.00	....
Cold Springs, Ohio	12.50	8.50	8.50	....	9.00	....	8.00	....
Delaware, Ohio	12.50	10.00	9.00	....	....	....	9.00	1.50
Frederick, Md.	....	10.00	9.50	10.00	....	....	7.50	1.45
Gibsonburg, Ohio (f)	12.50	8.50	8.50	....	9.00	....	8.00	....
Huntington, Ind.	....	8.50	8.50	....	9.00	11.00	8.00	1.50c
Luckey, Ohio (f)	12.50	....	....	....	....	....	....	....
Marblehead, Ohio	....	8.50	8.50	....	....	....	8.00	1.50c
Marion, Ohio	....	8.50	8.50	....	....	....	8.00	1.50c
Milltown, Ind.	....	9.00@10.00	....	10.00p	8.00_3	....	....	1.40r
Sheboygan, Wis.	....	11.50	....	....	....	....	9.50	....
Tiffin, Ohio	....	....	....	....	9.00	....	....	....
White Rock, Ohio	12.50	....	....	....	9.00	11.00	....	....
Wisconsin points (f)	....	11.50	....	....	....	....	9.50	....
Woodville, Ohio	12.50†	8.50†	8.50†	13.50†	9.00	11.00_1	9.00	1.50c
SOUTHERN:								
Allgood, Ala.	12.50	10.00	....	....	8.50	....	8.50	1.50
El Paso, Tex.	....	....	....	....	....	....	14.00	1.75
Graystone, Landmark and Wilmay, Ala.	12.50	10.00	....	....	8.50	....	8.50	....
Keystone, Ala.	12.00	10.00	10.50	10.00	9.00	....	8.50	1.50u
Knoxville, Tenn.	12.50	10.00	10.00	10.00	8.50	....	8.50	1.50
Ocala, Fla.	....	13.00	....	....	....	....	....	1.70
WESTERN:								
Calcite, Colo.	....	....	....	....	....	....	9.00¶	....
Kirtland, N. M.	....	....	....	....	....	....	15.00	....
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
New Braunfels, Texas	12.00	12.00	10.00	12.00	....	....	9.50	1.50
San Francisco, Calif.	21.00	21.00	12.50@15.00	21.00	....	....	14.50	1.90v
Tehachapi, Calif.	....	....	8.00	....	....	....	13.00z	2.20x
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00	....	18.60	2.30

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. net barrel 1.65; 280-lb. net barrel, 2.65 (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 10.50; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) to 3.00; (u) two 90-lb. bags; (v) oil burnt; wood burnt 2.25@2.50; (x) wood, steel 2.30; (z) to 15.00; (*) quoted f.o.b. New York; (‡) paper bags; (w) to 1.50 in two 90-lb. bags, wood bbl. 1.60; (¶) to 10.00; (1) 80-lb. paper bags; (2) to 3.00; (3) to 9.00.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Gray Summit and Klondike, Mo.	2.00	1.75
Mapleton, Depot, Penn.	....	2.00
Massillon, Ohio	....	2.25
Mineral Ridge and Ohlton, Ohio	*1.75@ 2.00	*1.75
Montoursville, Penn.	....	1.35
Ottawa, Ill.	1.25@ 1.50	....
Red Wing, Minn.	....	1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50@ 4.50	3.50@ 4.50
Thayers, Penn.	....	2.25
Utica, Ill.	1.00	1.00
Warwick, Ohio	....	2.25
Zanesville, Ohio	....	2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons, per gross	.08
per gross	1.25
Chatsworth, Ga.:	
Crude Talc	4.50
Ground (20-50 mesh), bulk	6.50@ 8.50
Ground (150-200 mesh), bulk	8.00@10.00
Pencils and steel worker's crayons, per gross	1.50
Chester, Vt.:	
Ground talc (150-200 mesh), bulk	9.00@10.00
Including bags	10.00@11.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc	5.00
Ground talc (150-200) bags	10.00@12.00
Pencils and steel workers' crayons, per gross	1.00@ 1.50
Emeryville, N. Y.:	
(Double air floated) including bags; 325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 300-350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.50
Ground talc (150-200 mesh), bags	9.75@15.00
Joliet, Ill.:	
Ground talc (150-200) bags	30.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	14.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%	4.50@ 5.00
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.	5.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@ 8.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 65%; bulk	7.25
Twomey, Tenn.—B.P.L. 65%	7.25@ 8.25

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	3.00
70% min. B.P.L., Basis 70%	3.55
72% min. B.P.L., Basis 72%	4.10
75/74% B.P.L., Basis 75%	4.85
77/76% B.P.L., Basis 77%	5.60

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00
No. 2 lump, per net ton	19.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	16.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	....	10.50
Brandon, Vt.—English pink and English cream	*11.00	*11.00
Buckingham, Que.—Buff stucco dash		‡12.00@14.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries	....	17.50
Crown Point, N. Y.—Mica Spar		8.00@10.00
Easton, Penn.—Green	16.00@20.00	16.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash	....	6.00@18.00
Middlebrook, Mo.—Red	....	20.00@25.00
Middlebury and Brandon, Vt.—Middlebury white	....	‡9.00
Milwaukee, Wis.	....	14.00@34.00
Newark, N. J.—Roofing granules	....	7.50
New York, N. Y.—Red and yellow Verona	....	32.00
Red Granite, Wis.	....	7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Calif. — "Natrock" roofing grits	....	12.00@16.00
Tuckahoe, N. Y.	....	12.00
Villa Grove, Colo.	....	13.00
Wauwatosa, Wis.	....	16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L.
*C.L. including bags; L.C.L. 14.50.
‡C.L. including bags, L.C.L. 10.00.

Potash Feldspar

Auburn and Brunswick, Me.—Color, white; 98% thru 140 mesh bulk	19.00
Bath, Me.—Color, white; analysis, potash, 12%; 100% thru 180 mesh, bags, 21.00; bulk	18.00
Buckingham, Que.—Color, white; analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 80 mesh	18.00
Finer grades	20.00@23.00
Erwin, Tenn.—Color, white; analysis, 12.07% K_2O, 19.34% Al_2O_3; Na_2O, 2.92%; SiO_2, 64.76%; Fe_2O_3, .36%; 98.50% thru 200 mesh, bags, 16.90; bulk	15.50
Glen Tay Station, Ont., color, red or punk; analysis: K_2O, 12.81%, crude, bulk	6.00@ 7.50
Los Angeles, Calif.—Color, white; analysis, K_2O, 10.35%; Na_2O, 3.62%; Al_2O_3, 18.71%; SiO_2, 65.48%; Fe_2O_3, .17%; 100% thru 150 mesh, bags, 24.00; bulk	22.00
Murphsboro, Ill.—Color, prime white; analysis K_2O, 12%; Na_2O, 2%; 65% SiO_2; crude, bags, 7.00; bulk	6.50
Pulverized; 98% thru 200 mesh, bags, 22.00; bulk	21.00
99% thru 100 mesh, bags, 21.00; bulk	20.00
100% thru 100 mesh; bags, 20.00; bulk	19.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00
Trenton, N. J.—Crude, bulk	12.00@27.00
99% thru 140 mesh; bulk	16.00
(Bags 11 cents each, non-returnable)	
Wheeling, W. Va.—Color, white; analysis, K_2O, 9.50%; Al_2O_3, 16.70%; Na_2O, 3.50%; SiO_2, 69.50%; 99% thru 140 mesh, bulk	19.00

Blended Feldspar

(Pulverized)

Tenn. Mills—Bulk	16.00@20.00
Toughkenamon, Pa.—Color, white to light cream; 98% thru 125-150 mesh, bags, 12.00@13.00; bulk	10.00

Chicken Grits

Afton, Mich. (limestone) per ton	15.00
Belfast and Rockland, Me.—(Limestone), bulk, per ton	11.00
Brandon and Middlebury, Vt., per ton	12.00‡
Centerville, Iowa (gypsum) per ton	18.00
Los Angeles Harbor (limestone), 100-lb sack, 1.00; sacks, per ton, 8.50@9.50†; bulk, per ton	6.00@7.00†
Toughkenamon, Pa.—(Feldspar) 100-lb. bags, 1.00; bulk, per ton	10.00
Danbury, Conn., Rockdale and West Stockbridge, Mass. — (Limestone) bulk	7.50@9.00*
Gypsum, Ohio.—(Gypsum) per ton	10.00
Limestone, Wash. (limestone) per ton	12.50
Rocky Point, Va. (limestone) 100 lb. bags, 75c; sacks, per ton, 6.00 bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	12.50

*L.C.L.
†Less than 5-ton lots.
‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass	14.50
Brighton, N. Y.	*19.75
Dayton, Ohio	12.50@13.50
Detroit, Mich.	†‡17.50
Farmington, Conn.	16.00
Flint, Mich.	¶12.50@16.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	*19.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.50
Madison, Wis.	12.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	*13.00
Minneapolis and St. Paul, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	13.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Sebewaing, Mich.	12.00
Syracuse, N. Y.	18.00
Terra Cotta, D. C.	13.50
Toronto, Canada	*15.60
Wilkinson, Fla.-White	12.00
Buff	16.00

*Delivered on job. †Delivered in city limits.
‡Less 5%. ¶Dealers' price.

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	....	3.47
Atlanta, Ga.	....	2.35
Baltimore, Md.	....	2.35
Birmingham, Ala.	....	2.30
Boston, Mass.	....	2.63
Buffalo, N. Y.	....	2.38
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	....	2.34
Charleston, S. C.	....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	....	2.37
Cleveland, Ohio	....	2.29
Chicago, Ill.	....	2.10
Columbus, Ohio	....	2.34
Dallas, Texas	.48¾	2.15
Davenport, Iowa	....	2.29
Dayton, Ohio	....	2.38
Denver, Colo.	.66¼	2.65
Detroit, Mich.	....	2.05
Duluth, Minn.	....	2.09
Houston, Texas	....	2.60
Indianapolis, Ind.	....	2.29
Jackson, Miss.	....	2.60
Jacksonville, Fla.	....	2.50
Jersey City, N. J.	....	2.33
Kansas City, Mo.	....	2.02
Los Angeles, Calif.	.61†	....
Louisville, Ky.	....	2.27
Memphis, Tenn.	....	2.60
Milwaukee, Wis.	....	2.15
Minneapolis, Minn.	....	2.32
Montreal, Que.	....	1.90
New Orleans, La.	....	2.40
New York, N. Y.	....	2.25
Norfolk, Va.	....	2.17
Oklahoma City, Okla.	....	2.56
Omaha, Neb.	....	2.51
Peoria, Ill.	....	2.27
Philadelphia, Penn.	....	2.41
Phoenix, Ariz.	....	3.70
Pittsburgh, Penn.	....	2.09
Portland, Colo.	.72½	2.90
Portland, Ore.	....	2.90
Reno, Nevada	.75¼	3.01
Richmond, Va.	....	2.44
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	....	2.31
Savannah, Ga.	....	2.50
St. Louis, Mo.	.55	2.20
St. Paul, Minn.	....	2.32
Seattle, Wash.	10c discount	2.65
Tampa, Fla.	....	2.60
Toledo, Ohio	....	2.20
Topeka, Kans.	....	2.40
Tulsa, Okla.	....	2.43
Wheeling, W. Va.	....	2.17
Winston-Salem, N. C.	....	2.79

NOTE—Add 40c per bbl. for bags.
†Delivered on job in any quantity, sacks extra.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	....	1.85
Chattanooga, Tenn.	....	2.45*
Concrete, Wash.	....	2.35
Davenport, Calif.	....	2.05
Detroit, Mich.	....	2.15
Hannibal, Mo.	....	2.05
Hudson, N. Y.	....	2.05
Leeds, Ala.	....	1.95
Mildred, Kans.	....	2.35
Nazareth, Penn.	....	1.95
Northampton, Penn.	....	1.95
Steelton, Minn.	....	1.90
Toledo, Ohio	....	2.20
Universal, Penn.	....	1.85

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ⅜x32x36". Wt. 1500 lb. Per M Sq. Ft.	—Plaster Board— ½x32x36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	2.50	12.00m	12.00m	7.00	8.00	8.50	10.00	....	25.80	10.00	....	....	....
Detroit, Mich.‡	....	....	....	11.30	11.30	11.30	....	8.00	....	....	....	....	....
Delawanna, N. J.	....	....	....	....	....	....	....	9.00@9.40	....	....	.14@.15s	.15@.16s	40.00
Douglas, Ariz.	....	....	7.00	....	....	15.50d	18.50	....	30.00	15.50	....	....	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	24.55	20.00	....	....	....
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	18.00	7.00	27.00	18.00	....	15.00	30.00
Hanover, Mont.	....	....	....	11.80	....	....	....	....	....	....	....	....	....
Los Angeles, Calif.	....	....	....	10.30k	....	....	....	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	....	20.00	30.00
Portland, Colo.	....	....	....	10.00	....	....	....	....	....	....	....	....	....
San Francisco, Calif.	....	....	....	13.40r	14.40r	....	15.40r	....	....	....	....	....	....
Seattle, Wash.	6.70	....	11.00	10.00	....	....	....	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	18.00a	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 25.00; (b) net; (c) gross.
(d) hair fibre; (f) delivered; (h) delivered in 6 states; (i) delivered on job; (k) sacks 12c extra, rebated.
(m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board; (t) to 16.50.

Start Work Soon on New Buffalo Cement Plant

BUILDING of the new cement plant at Buffalo, N. Y., will be started within a short time. The location has been definitely decided on and will be on the Union canal between the Harbor Turnpike and the lake front.

The company building the plant is to be known as the Great Lakes Portland Cement Corp., and is said to own limestone deposits of approximately 2000 acres at Rogers City, Mich., from which place it will be brought to Buffalo by lake freighters, and 60 acres of shale deposits at Shaleton, N. Y. The Buffalo site, which was purchased from the Pennsylvania Railroad Co., consists of 30 acres, of which 20 acres will be occupied by the cement mill. Work will soon be started on excavation for the buildings; test borings and other preliminary work having been in process during the past.

Construction work will be in charge of the officers of the company who also designed the plant. Among these officers are men who have been identified with the portland cement industry for years and includes Adam L. Beck of Indianapolis, who is president of the new corporation and M. H. Hammond, vice-president. Recently they sold the plant of the Indiana Portland Cement Co. at Green Castle, Ind., which they had built and operated. Prior to this they had been identified with the Oklahoma Portland Cement Co., Ada, Okla. Mr. Hammond some time ago built a cement plant in Argentina for the International Cement Corp.

Plans call for a modern, electrically operated mill with an output of 7000 bbl. per day, this schedule to be reached within 18 months after beginning of construction. The finished cement is to be shipped by rail, truck or canal to districts within a 200-mile radius of Buffalo.

The company has been incorporated for 60,000 no-par shares of common stock. The directors of the company are George A. Ball, Muncie, Ind.; Seymour H. Knox, Buffalo; Adam L. Beck, Indianapolis; M. H. Hammond, Indianapolis; Marshall Beck, Indianapolis; Fletcher M. Durbin, Chicago; Paul M. Taylor, Huntington, Ind.; J. F. Schoellkopf, jr., Buffalo; G. A. Tomlinson, Cleveland; Bert B. Williams, Indianapolis; and John H. Love, New York City. The officers who will all be active in the management of the company are: Adam L. Beck, president; M. H. Hammond, vice-president; Bert B. Williams, second vice-president; Marshall Beck, secretary and treasurer.

Offices of the company have been opened on the sixth floor of the Marine Trust Company building, Buffalo, N. Y.—*Buffalo (N. Y.) Times.*

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City of shipping point	8x8x16 (Sizes)	8x10x16	8x12x16
Camden and Trenton, N. J		.19‡	.30‡
Columbus, Ohio	.16@.18a		
Detroit, Mich.	16.00*		26.00*
Forest Park, Ill.	18.00*	23.00*	30.00*
Graettinger, Iowa	.18@.20		
Indianapolis, Ind.	.13@.15†		
Los Angeles, Calif.¶	5¾x3½x12—50.00; 7¾x3½x12—60.00		
Oak Park, Ill.	.18@.21a		
Somerset, Pa.	.20@.22		
Yakima, Wash.	20.00*		

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000.

Cement Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Cement City, Mich. — 5"x8"x12", per M	55.00

Cicero, Ill.—Hawthorne tile, per sq.

	Chocolate Red and Orange	Green and Blue	Yellow, Tan Slate Gray
French and Spanish†	$11.50	$13.50	$12.75
Ridges	.25	.35	.30
Hips	.25	.35	.30
Hip starters	.50	.60	.60
Hip terminals, 2-way	1.25	1.50	1.50
Hip terminals, 4-way	4.25	5.00	5.00
Mansard terminals	2.50	3.00	3.00
Gable finials	1.25	1.50	1.50
Gable starters	.25	.35	.30
Gable finishers	.25	.35	.30
*End bands	.25	.35	.30
*Eave closers	.06	.08	.06
*Ridge closers	.05	.06	.05

*Used only with Spanish tile.
†Price per square.

Chicago, Ill.—per sq.	20.00
Detroit, Mich., per sq.:	
5x4x12	12.00
5x8x12	20.40
Grand Rapids, Mich.:	Per 1000
5x4x12	45.00
5x8x12	70.00
5x8x 6	35.00
Graettinger, Iowa: Cement tile per 100 ft.	
5-in	4.50
6-in	5.60
8-in.	9.00
10-in.	12.00
12-in.	17.50
14-in.	25.00
16-in.	35.00
18-in.	45.00
20-in.	60.00
22-in.	70.00
24-in.	80.00
30-in.	100.00
Houston, Texas.—Roofing Tile, per sq.	
Red	17.00
Green	19.50
5x4x12 (Lightweight)	45.00
5x8x12 (Lightweight)	80.00
Indianapolis, Ind.—9"x15"	
Gray	10.00
Red	11.00
Green	13.00
Longview, Wash.—(Stone Tile)	Per 1000
4x6x12	55.00
4x8x12	65.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Pasadena, Calif.:	Per 1000
4x4x12	$30.00
4x6x12	50.00
4x6x12	55.00
Tacoma, Wash.—Drain tile per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waco, Texas:	Per sq.
4x4	.60
Wildasin Spur, Los Angeles, Calif:	
4x3½x12	.03½
6x3½12	.04½
8x3½x12	.05½
Yakima, Wash.:	
5x8x12	.10

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@75.00
Milwaukee, Wis.	15.00	25.00@75.00
Mt. Pleasant, N. Y.		14.00@23.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	12.50	
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	17.00	25.00@75.00
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	25.00@40.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	21.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

†Gray. ‡Red.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.										$16.00 per ton							
Graettinger, Iowa	.04½d	.05½	.08½	.13	.17½		.50	.60	.75	.85							
G'd Rapids, Mich. (b)				.60	.72	1.00	1.28			1.92	2.32	3.00	4.00				
Houston, Texas		.19	.24	.43	.55½	.90	1.30		†1.70	2.20							
Indianapolis, Ind. (a)				.80	.90	1.10	1.30			1.70		2.70					
Longview, Wash.							Sewer pipe 40% off list, culvert—list										
Mankato, Minn. (b)										1.50	1.75	2.50	3.25	4.25			
Mt. Pleasant, N. Y.		.17	.26	.39	.50	.68	.93	1.29		1.67							
Norfolk, Neb. (b)				.90	1.00	1.13	1.42			2.11		2.75	3.58		6.14		7.78
Paullina, Iowa‡								2.25		2.11		2.75	3.58		6.14		7.78
Somerset, Pa.					80[1]	1.00[2]	1.40[3]			2.00[4]		3.25[5]	4.00[6]	6.00[7]			
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.80										
Tiskila, Ill. (rein.) (a)				.65	.75	.85	1.10	1.60		1.90			3.40				
Wahoo, Neb. (b)					1.00	1.13	1.42			2.11		2.75	3.58	4.62	6.14	6.96	7.78
Waukesha, Wis.										All sizes $9.00 per ton							
Yakima, Wash.										$10.00 per ton							

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced.
†21-in. diam. ‡Price per 2 ft. length. (d) 5 in. diam. [1]@1.08. [2]@1.25. [3]@1.65. [4]@2.50. [5]@3.85. [6]@5.00. [7]@7.50.

Beaver Board Company to Make Large Extensions to Akron (N. Y.) Plants

ACCORDING to a report in the *Akron (N. Y.) Journal,* issued on the authority of Charles Spengler, superintendent of the Beaver Products Co. plants at Akron, N. Y., the company will soon begin extensions to their plants at that place to cost about $500,000.

This new program of development will increase the production capacity of the calcining division of the plant 50%, and will include two more kettles and grinding equipment to match. It will be housed in a new three-story fireproof steel building with concrete floors. The east portion of the present old structure will be razed to accommodate this new building and thereby bring the entire big plant into one harmonious unit for the handling of materials with speed.

Another building, 46x160 ft., two-story concrete and steel, will be built west of the main building to take care of the extra capacity required for mixing, shipping and storage.

To the south of the present building a new one-story steel building, 60x126 ft., will be built for the housing of machinery, parts and supplies.

The above new work, together with the new steel building, 125x340 ft., now being erected west of the plaster plant for the manufacture of partition tile, will mean the expenditure of approximately a half million dollars during the next few months at the plant.

This large expenditure by the Beaver Products Co. will dispel any doubts of the decline of the gypsum industry about Akron. It is said that sufficient gypsum rock underlies the territory leased by the company north and west of the plant to warrant active operations on the new capacity mills from 20 to 40 years.

Developments of Gypsum Deposits in District Due to Geo. J. Ralph

Little did Akron people believe 20 years ago when various futile attempts were made to bring the gypsum value that underlies this region to the surface that the gigantic present day success would or could ever be achieved. Water and a never ceasing supply, that hindered the early attempts at mining the product 30 ft. below the surface, seemed to be more powerful than man's ingenuity to combat, yet the various attempts and failures only tempered the desires of the different promoters until today the gigantic industry that now cover acres of the Wilder farm, that 20 years ago was a modest acreage, seems also without truth, but the big plant industry alone spreads out upon the broad acres to substantiate the reward that comes to every undertaking which public necessity demands—men and capital being the essentials to success.

The first attempt to uncover gypsum wealth that underlies this town was begun about 1900 by a half dozen local men who had no idea of the extent of the undertaking until a shaft had been sunk. Then the water problem came—a rushing and roaring hidden lake seemed to be seeking an outlet at a depth of about 60 ft., where the gypsum strata begun. After days and nights of useless effort these men abandoned the idea of further development, because there was no inducement for anyone to put money into a lake draining proposition, as it seemed. In about 1902 the late George J. Ralph, who had been employed by the United States Gypsum Co. at Oakfield, learned of the big gypsum field in Akron and he arranged with the local promoters to take over the attempted development and try his luck. He decided to sink a new shaft farther to the south, believing that this new location would escape the undercurrent water. But Mr. Ralph encountered the same water trouble in his new shaft and tried about every available means to drain the large volume of water as it entered, but the pumps failed. Then he conceived the idea of stopping the opening at the base of the shaft by plugging the large water inlet with sacks of portland cement. To do this work under 30 to 40 ft. of water in the shaft was necessary to obtain the services of a diver. A Mr. Bovee of Buffalo, an experienced diver with equipment for deep water work, was engaged. Air was supplied to the diver by a hand pump located at the top of the shaft. After working two or three days on the job the pumpers were signaled by Bovee to "come up," but when he was brought to the top of the water his air mask was removed from his face and clutched in his hand. He was speedily hauled to the top of the shaft and medical aid summoned, but he died before assistance arrived. The cause of death it was said was due to apoplexy, due to the extreme cold water and length of time the man remained in it.

To facilitate the work of development for the benefit the gypsum industry would bring to Akron, a purse of $1,000 was subscribed among citizens and presented to Mr. Ralph to aid him in the expense incurred. And Mr. Ralph with many hindrances succeeded in bringing the gypsum matters to the attention of outside capital whereby a company was formed, new capital obtained, better and more modern equipment installed to combat with the water evil and eventually the mining of the rock was assured and a mill was built. But it required a lot of good money to bring the industry to a profit, and seemingly the stockholders looked at "everything going out and nothing coming in," and they quit. Thus Mr. Ralph in the very height of his success (as since proven) was compelled to quit, and the interests went in the hands of the receivers. It was then bought by the Cold Spring Construction Co. of Buffalo, Eugene Forrestel of Akron in charge.

Mr. Forrestel gave the interests much attention and financial expenditures and in a degree improved greatly on the methods of taking care of the water in the mines. After two years of operation, Mr. Forrestel sold the plant to the American Cement Plaster Co. with other similar interests in the west, and right here is where the undertaking took on its air of importance in the manufacturing world because there was plenty of capital available for the industry, and the supply of gypsum rock was assured to warrant any expenditure necessary to produce it.

At that time, about 1916, the present superintendent, Charles Spengler of Oakfield, was engaged to manage the industry and how well he has performed is very much in evidence today. Mr. Spengler by his natural gypsum experience has induced into the business various devices and improvements that have minimized the labors and made working conditions a pleasure and safety for laborers in all departments. In other words, he came onto the job in 1916 and has been on it in both person and interest ever since.

About six years ago the Beaver Products Co. united its big interests with the American Cement Plaster Co. and thereby strengthened the whole industry to the extent that under the name of the Beaver Products Co., Inc., the Akron plant today is employing about 400 men, and new additions will double the capacity and double the employment schedule. In addition to these extensions there are several new buildings under construction by the Gypsum Products Corporation, which is a unit of the Beaver Products Co., in gypsum supply only. It manufactures the fireproof floor and roof slabs that are now an integral part of much of the new building construction work in all of the large cities in the east.

Large Gypsum Deposits Uncovered in Ontario

THE discovery has been reported of a very large deposit of gypsum 140 miles north of Cochrane, which tests indicate to be of an exceptionally good quality.

According to Premier Howard Ferguson, representations are now being made to the government to extend the T. & N. O. line north so as to aid in exploitation of the field and to facilitate the extensive shipping that is expected to follow.

According to the Premier, one prominent Canadian firm has offered to contract for 2,000 to 20,000 tons of gypsum daily and proposes to provide ample guarantee that it will carry out the terms of any agreement entered into with the government.

Kirkland Sand and Gravel Company Shows Rapid Growth

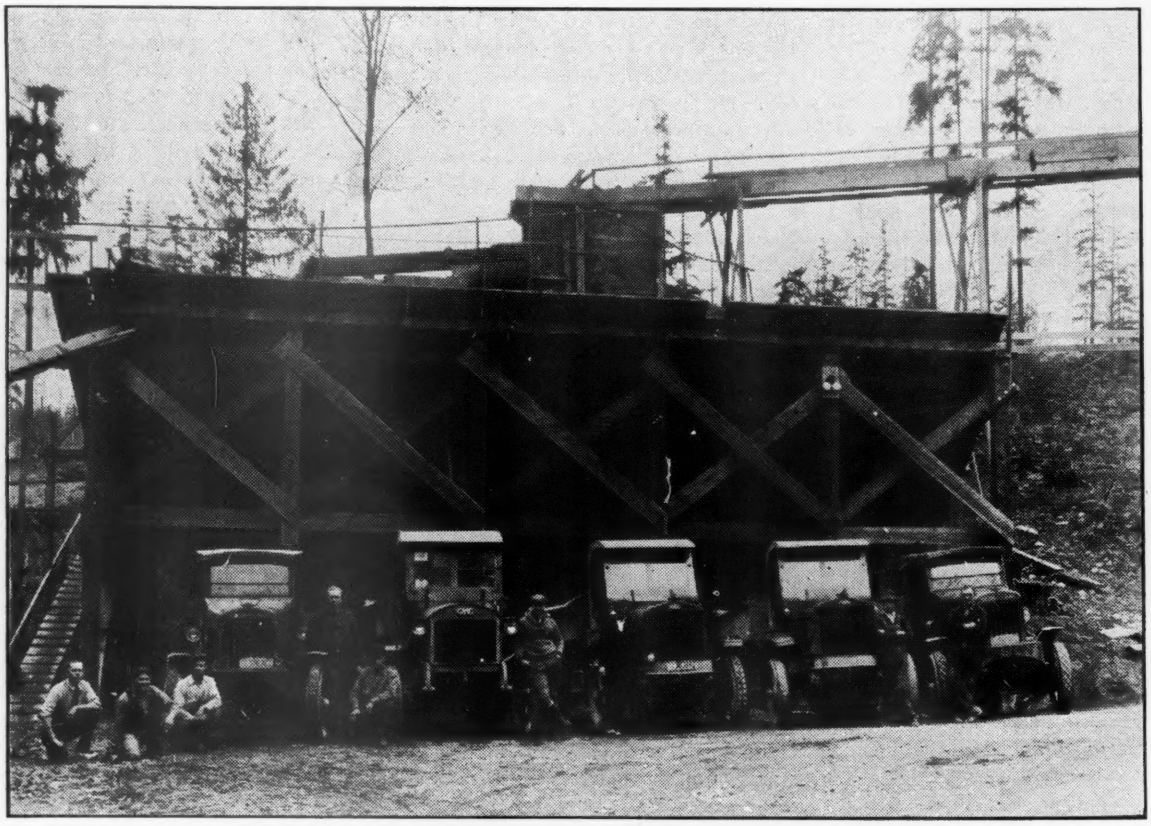
THREE years ago there was organized at Kirkland, Wash., the McIntyre Sand and Gravel Co. At that time the company had bunker room for about 40 yd. of sand and gravel. Today under the name of the Kirkland Sand and Gravel Co. that same company has a most modern gravel pit with bunker room for about 400 yd. of sand and gravel.

The plant is electrically equipped throughout, with tower and bunkers of the most modern construction. The plant is valued at $25,000.

The old company was reorganized as the Kirkland Sand and Gravel Co., May 12, 1925, with R. J. McIntyre as president; G. A. Purdy, vice-president, and F. J. Purdy, secretary-treasurer.

The new company is enjoying the same consistent conservative growth that the old company had. The officials plan to grow with the community, and are well pleased with the prospects for the future. "At times even now," said R. J. McIntyre, "we have as high as 15 trucks waiting their turn at the bunkers. Many buyers haul their own gravel from the pit."

The company covers a large territory going south as far as Mercer Island west to Lake Forrest Park and east to Redmond. Four men are steadily employed at the pit and put out over 200 yd. of sand and gravel per day.—*Kirkland (Wash.) Journal.*



Bunkers of the Kirkland Sand and Gravel Co. of Kirkland, Wash.

Consumers Rock and Gravel Company Purchases Harris and Hull Plants

A RECENT announcement in the Los Angeles (Calif.) *Times* states that the crushing plants of the Harris and Hull Co. located near Roscoe, Calif., and on the Big Tejunga wash have been purchased by the Consumers Rock and Gravel Co. of California. The Roscoe plant was described in February 6 issue of ROCK PRODUCTS. It is known as a plant of modern design and equipment capable of producing about 1500 tons per day.

The old Hewitt plant of the Consumers company will be used for sand and gravel, while the recently acquired plant will make crushed rock only. It was stated that the company is likely to run a spur track from the Southern Pacific railroad into the Big Tejunga plant.

McGrath Sand and Gravel Company to Improve Chillicothe Plant

T. E. McGRATH of the McGrath Sand and Gravel Co., Lincoln, Ill., operating five plants in Illinois, has written us concerning the improvements to be made at their Chillicothe, Ill., plant.

A 15-in. pump will be installed in addition to the two Sauerman dragline cableway buckets now in operation. The pump will enable the company to boost capacity 50% if the demand makes it necessary. There is also under construction a storage system which will store from 75,000 to 100,000 tons of prepared material of various sizes over a concrete tunnel. This tunnel is equipped with gates every 15 ft., and in it is operated a belt which feeds directly into railroad cars. The prepared material is carried from the plant by a belt which is supported by steel trestle work and operated over the tunnel.

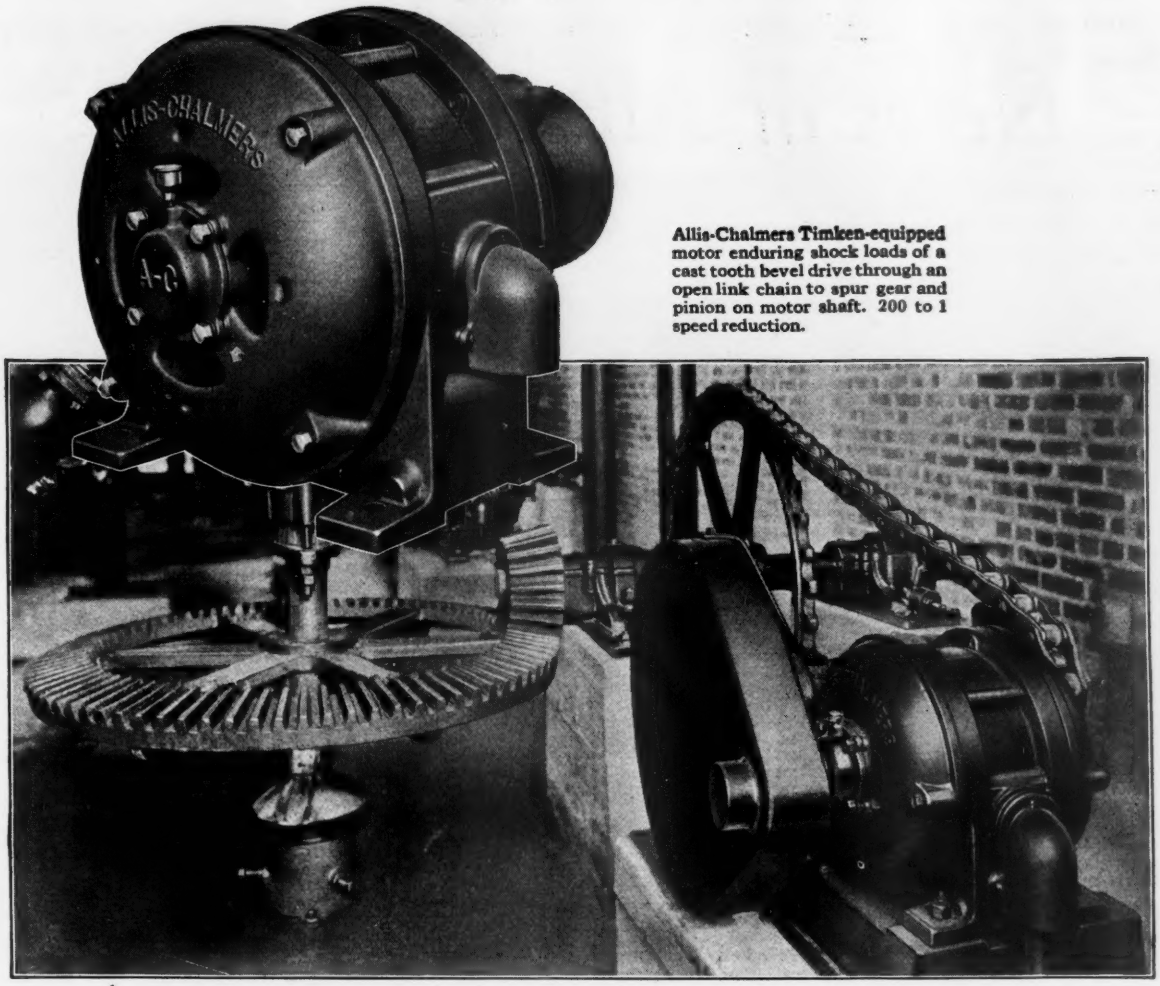
Williamsport Gravel Plant Sold

THE sale of the D. N. Thomas Sand and Gravel Co. of Williamsport, Penn., operating along the Susquehanna river at that place, to the West Branch Sand and Gravel Co., Northumberland, Penn., for a price of $100,000, has been completed, according to an announcement in the Williamsport, Penn., *Sun.*

The purchase of the Thomas plant includes all of the holdings of the company in the way of dredges, diggers, flats, trackage and other facilities for digging and handling the product. The plant has been in operation for the past 28 years.

The new owners plan extensive improvements which will practically double the daily output, which is now about 10 cars of sand and gravel a day. In addition to this sand and gravel taken from the river bed, apparatus will be installed for the manufacture of special sand for concrete.

The West Branch company already operates a plant at Linden, Penn., with a yearly output of 200,000 tons of washed and graded river sand.



Allis-Chalmers Timken-equipped motor enduring shock loads of a cast tooth bevel drive through an open link chain to spur gear and pinion on motor shaft. 200 to 1 speed reduction.

Working for Less

In every great industry, at every brutal task, Allis-Chalmers electric motors have for years given the very best account of themselves. Unusual power, endurance and all-around economy are to be expected of the many unusual and exclusive Allis-Chalmers practices.

Allis-Chalmers frames, spiders and other parts, wherever possible, are of cast steel in preference to lesser metals. The laminated core construction is a scientific achievement. Windings are insulated and baked by special Allis-Chalmers processes unequaled for thoroughness. The uniformity of cooling is itself a tribute to Allis-Chalmers engineering. Lubrication is most highly developed.

Now Allis-Chalmers betterments also include Timken Tapered Roller Bearings on the shaft. Rigidity, compactness, endurance, economy are multiplied. Here are motors that run for months at least without added lubrication—motors that run for life without bearing deterioration.

In its line of induction motors with anti-friction bearings, as in all other types, Allis-Chalmers offers electric motors best able to pay for themselves.

ALLIS-CHALMERS MANUFACTURING CO., MILWAUKEE

District Sales Offices in all Principal Cities

ALLIS-CHALMERS MOTORS

News of All the Industry

Incorporations

Cement Products Corp., Kelsey City, Fla. J. M. Dixon, G. W. Hammond.

Fort Pierce Concrete Tile Co. Ft. Pierce, Fla. F. W. Modersohn, W. Liddon.

Newsom-Smith Limerock Co. Williamston, Fla., $25,000. L. S. Newsom and O. O. Smith.

Yosemite Portland Cement Corp., Fresno, Calif. Increased capital from $1,650,000 to $3,000,000.

Phillipsburg Concrete Products Co., Wilmington, Del., $75,000. (Delaware Registration Trust Co.)

Doll & Tinling Cement Products Co., Ft. Lauderdale, Fla., $25,000. H. W. Doll, U. S. Tinling.

Crescent Sand and Gravel Co., Yakima, Wash., $10,000. H. A. and C. B. MacNeil, J. J. Ferrier.

Albany Molding Sand Co., Inc., Albany, N. Y., $500. L. F. O'Neil, A. N. Blair and J. F. Wood.

Belmont Crushed Stone Quarries changed name to Belmont Concrete Products Co., Philadelphia, Penn.

Million Sand and Gravel Co., Lake Cicott, Ind., $75,000. Floyd, William F., Jennie and Mayme Million.

St. Augustine Concrete Products Co., St. Augustine, Fla., $25,000. F. D. Upchurch, 57 Water St., and others.

Hoosier Sand and Gravel Co., Terre Haute, Ind., $10,000. W. K. Ely, Milburn Richardson and M. A. Berkowitz.

Willow Sand and Gravel Co., Cleveland, Ohio, $20,000. John and Anna Kolus, L. C. and J. Vaigle, John Schier.

Madison Sand and Gravel Corp., Hamilton, N. Y. 700 shares of $100 par and 2000 shares common, no par.

Flushing Sand and Gravel Co., Flushing, N. Y., $25,000. H. W. Alden, H. M. O'Connor. (Atty., C. S. Golden, Flushing.)

Washington Cement Co., Seattle, Wash., $10,000. Phillips Morrison, Leary Bldg., Seattle; Arthur G. Smith and F. R. Bates.

Northwestern Portland Cement Co., Grotto, Wash., $2,000,000. F. T. Crowe, Seattle; G. MacDonald and C. T. W. Hollister.

Allied Quarries, New York, N. Y., $10,000. T. M. and M. I. Boyce, Jr., E. H. Low. (Atty., R. Spear, 10 West 40th St., New York.)

Druecker-Kaestner Co., Shorewood, Wis., $125,000. John P. Druecker, Bruno Kaestner and L. W. Sanders. General quarrying business, etc.

Great Lakes Portland Cement Corp., Indianapolis, Ind. 60,000 shares no par value. Adam L. Beck, M. H. Hammond, Marshall Beck and Bert B. Williams.

Dayton Portland Cement Co., Dayton, Ohio, $1,000,000. James F. Gibbons, Dayton; Adam Gilbert, Germantown; Bascom Parker, Niles, Mich., and others.

Jaeger Sand and Gravel Co., Inc., Milwaukee, Wis., $100,000. Henry Jaeger, Henry Germert and William Frentz. To mine, quarry and deal in stone, sand, gravel, etc.

Glen Falls Portland Cement Co., Glen Falls, N. Y., increased capital stock from 12,000 to 45,000 shares of which 1000 are of $100 each and 44,000 common of no par value.

Sand and Gravel

L. F. Thompson of Joplin, Mo., will develop sand deposits at Melva, Mo.

Knuth & Miller have acquired and will develop gravel pits near Boynton, Fla.

Marion Sand and Gravel Co., Marion, Ohio, is reported to establish a $300,000 sand plant at Chattanooga, Tenn.

Forth Worth Sand and Gravel Co., Fort Worth, Tex., has let the contract for erection of a $30,000 gravel plant.

Preston Glass Sand Co. has been put into the hands of J. M. Strouss, special receiver appointed by the circuit court, Monongahela county, W. Va.

Allegheny Sand and Gravel Co., Hickory, Penn., had part of its plant destroyed when an ice gorge at that place broke up and passed down the river.

Jesse M. Corzine, Waukegan, Ill., formerly of the Decatur Coal Co., has purchased the gravel pit and property of the late W. H. Duerr near Waukegan for a reported price of $25,000.

Lake Wier Estates, Inc., Miami, Fla., of which Louis B. Magid is manager, is interested in the development of silica sand deposits in Marion county, for the manufacture of glass.

Deckers Creek Stone and Sand Co., Morgantown, W. Va., has been put into receivership and a hearing set for the creditors at an early date. J. M. Strouss has been named special receiver by the circuit court.

Superior Sand and Gravel Co., Seattle, Wash., has purchased the property and leases of the San Juan Gravel Co., at Friday Harbor, Wash. The reported price is given at $50,000. It is expected that extensive improvements to the plant will be made within a short time.

Central Sand and Gravel Co., Radway, Ark., will soon put its recently constructed plant on the Saline river in operation. The new plant will be operated by electricity and represents an investment of $25,000. E. N. Jenkins is president of the concern and E. W. Higgis will be in charge of operation.

Meteor Transport & Trading Co., Wilmington, Del., and Miami, Fla., is expanding its business to include a sand and rock department. The Meteor company has placed an order with the American Car & Foundry Co. of Wilmington to build 15 sand barges and one large dredge. It has also been decided to build a tug boat about 55 ft. long to be equipped with a Diesel engine.

The total value of the contracts approximates $350,000 and the work is to be rushed to completion as rapidly as possible. Construction of seven of the barges is already under way at the local yards. The hull for the dredge unit will have a beam of 50 ft. and a length of about 160 ft.

At a stockholders meeting a short time ago, Charles Warner was elected to the position of chairman of the board, Raymond Callaway was made president, Paul J. Rutan, vice-president, and general sales manager. C. A. Sawyer, secretary-treasurer.

Quarries

Atlas Rock Co., Oakdale, Calif., has concluded negotiations for a 56-acre gravel deposit near Oakdale. The expanding operations of the company are said to have made the purchase necessary.

Cement

Louisiana Portland Cement Co. has awarded contract to Reeves Bros. Co., Birmingham, Ala., for two kilns and coolers for their new plant at New Orleans, La.

Phoenix Portland Cement Corp. has started preliminary construction work at their new plant to be built at Birmingham. Details of the proposed plant to be built by Lindley C. Morton, organizer of the new company, were published in Feb. 20 issue.

Cement Products

Concrete Pipe Co., Nampa, Ida., is about to begin erection of a factory building at 424 11th Ave. N.

Danville Concrete Products Co., Danville, Ky., is reported to be planning the erection of a cement products plant.

H. D. Penne is about to begin erection of the first unit of a cement products plant at 12 Ave. N., Nampa, Ida.

Cement Stone Silo Co., Imlay City, Mich., will rebuild the plant in the spring which was recently destroyed by fire.

W. C. Rhoades, of the Indian River Heights Co., Delray, Fla., plans establishing a factory for the manufacture of cement blocks.

Louis Larson, 28 N. E. 14th St., Coral Gables, Fla., is about to begin erecton of a cement block plant on Avenue Greco.

Riverside Concrete Products Co., Eastern Ave. and Hollywood Park, Baltimore, Md., is to expend $10,000 on new construction and machinery.

Riverside Concrete Products Co., Baltimore, Md., are planning the installation of additional equipment and new construction to their plant to cost about $10,000.

Sand-Lime Brick

J. G. Shepard & Co. have bought the assets of the West Lake & Products Co., Ltd., and have moved the machinery from the old plant at West Lake to Wellington, Ont. The plant consists of two units with a capacity of 40,000 brick per day. The new company has a good supply of sand on a property of 502 acres. They also intend pumping sand from Wellington harbor and at the same time clear the harbor for bringing in supplies and shipping brick.

Lime

The Batesville White Lime Co., Little Rock, Ark., which operates an industrial railroad between its plant at Limedale and its quarry at Bethesda, two and one-half miles away, will lay a track to the Independence County Marble Co.'s quarry soon. The latter concern is located near Bethesda. The new track will be about a half mile long.

Gypsum

Nova Scotian production of gypsum, limestone, etc., during 1925 was valued at $4,500,000.

U. S. Gypsum Co. has leased additional demonstration and office space in the Thorpe Bldg., 519 Marquette Ave., Minneapolis, Minn.

Agricultural Limestone

Bromide Crushed Rock Co., Durant, Okla., is offering to farmers of Bryan county, a free carload of agricultural limestone to be used for demonstration purposes. Each farmer will be asked only to pay freight charges which are said to average about 65 cents per ton.

Rock Asphalt

Rock Asphalt Products Corp. is about to erect a $60,000 factory in Tampa, Fla., on Flagler St.

Miscellaneous Rock Products

Southwestern Stucco Co., Ponca City, Okla., has announced plans for the erection of a stucco plant of 30 ton hourly capacity at Ponca City. The company was recently incorporated for $150,000 and J. W. Wagner appointed manager.

Personals

Wm. H. Watson has become vice-president and East Bay manager for the Acme Gravel Co., San Francisco, Calif.

P. A. Koehring, general manager and secretary-treasurer of the Koehring Co., was recently unanimously elected president of the Milwaukee Association of Commerce.

W. H. Potter, formerly Eastern representative of ROCK PRODUCTS, is now associated with the advertising firm of James B. Ellis, Bustleton, Penn.

A. W. Bruestle has been transferred from the traffic department to the position of assistant to the manager of the Lime Products department of the Charles Warner Co., with headquarters at Philadelphia.

S. C. McCurdy, who resigned recently as sales manager of the Alabama Portland Cement Co., has again become associated with Lindley C. Morton, and is to be sales manager of the new Phoenix Portland Cement Corp.

Mr. McCurdy has been associated with Mr. Morton for many years and he came to Birmingham when the North Birmingham plant was built.

W. R. Hazzard has been made assistant manager of the Lime Products departments of the Charles Warner Co., Wilmington, Del. He will continue as before in his work in the traffic department of the company. The positon of assistant manager was created to enable F. A. Daboll, manager, to devote more time to the executive and directing responsibilities. Mr. Hazzard will have his headquarters at Wilmington.

Obituaries

George H. Herzberg, president of the Western Wallboard Co., Seattle, Wash., died recently at his home in Seattle.

Daniel J. Finnegan, president of the Pacific Plaster Co., died recently at his home in Los Angeles, Calif., after an illness of four months.

Manufacturers

National Electric Manufacturing Co., Pittsburgh, manufacturers of the Syntron "Motorless" Electric Hammer, announce the following new officers and managers in charge: Syntron-Boston Co., John L. Shea, manager; 308 Congress St., Boston, Mass.; Syntron-Detroit Co., E. Earl Beatty, manager; 5001 S. Clarendon St., Detroit, Mich.

The following distributors have also been added to their sales organization: The Electric Sales Co., 138 Third St., S. W., Canton, Ohio; Arthur E. Jones, Co., 415 S. A. & K. Bldg., Syracuse, N. Y.; Imperial Machinery Co., 93-95 16th St., Wheeling, W. Va.; Roberts Electric Co., Sherman, Texas; J. M. Wheeler, 2008 North St., Harrisburg, Penn.; J. W. Bartholow Co., 1221 S. Lamar St., Dallas, Texas; Van-Bernard Neville Co., Kemper Bldg., Kansas City, Mo.; Fort Wayne Pipe & Supply Co., 225-227 East Columbia St., Fort Wayne, Ind.; Home Equipment Co., 132 Third Ave., N., Nashville, Tenn.

Hill Clutch Machine and Foundry Co., Cleveland, Ohio, are sending out a questionnaire to all users of their equipment to gather material for their new catalog on power transmission and equipment.

Southern Iron & Equipment Co., Atlanta, Ga., announce the election of H. M. Pratt as second vice-president and sales manager, and the appointment of R. A. Garner as successor to A. J. Merrill, deceased, to secretary and treasurer of the company.

Climax Engineering Co., Clinton, Iowa, announce the appointment of the Briggs-Weaver Co., Dallas, Texas, as district representatives and the Petroleum Electric Co., Tulsa, as selling agents for Climax engines in the southwest. P. J. Casey, Wells hotel, Tulsa, Okla., is in charge of the southwestern sales territory and will supervise the sales. The appointment is also announced of Rapp-Huckins Co., Inc., 59 Haverhill St., Boston, Mass., as district representatives.

Nugent Steel Castings Co., Chicago, Ill., announces the election of H. C. Osman as secretary of the company. Mr. Osman was formerly sales manager and will continue to have charge of the sales. C. A. MacDonald, formerly secretary, has been elected treasurer.

American Hoist & Derrick Co., which has its works and main offices at St. Paul, Minn., has recently opened another branch office, at 1943 Railway Exchange Bldg., St. Louis, Mo., with Ward B. Maurer in charge. Before joining the sales force of the American Hoist & Derrick Co., several years ago, Mr. Maurer was a member of the engineering staff of the Baltimore & Ohio railroad.

Dayton Whirley Co., Dayton, Ohio, announces that it has recently absorbed the plant and all property of the I. R. Bailey Equipment Co. also of Dayton. The taking over of the plant will permit the company to manufacture and assemble Wiley Whirleys completely under one roof. The offices of the company have been moved to the new plant, 228 Kiser St. Mr. Bailey, vice-president, is in charge of sales.

Era Steel Co., Bucyrus, Oho, has been incorporated to take over after March 1 the operation of the steel foundry and sales of manganese and alloy steel products of the Hadfield-Penfield Steel Co., Bucyrus.

Raymond Bros. Impact Pulverizer Co. have removed their New York office to 342 Madison Ave. S. B. Kanowitz, eastern manager, will be located at this address.

Sanderson Cyclone Drill Co., Orrville, Ohio, has acquired the engine and tractor division of the Wellman-Seaver-Morgan Co., Cleveland, and will develop this branch. Plans for an increase of 75,000 sq. ft. to the Orrville plant are under way and the acquired business will be removed to this plant. The company is also working on a new type of gasoline engine for motor busses.

Hewitt Rubber Co., Buffalo, N. Y., and the Gutta Percha and Rubber Mfg. Co., N. Y., have merged their financial interests with a subsequent removal of the latter's plants and offices to Buffalo. At a reorganization meeting held in Buffalo, N. Y., F. E. Miller was elected president of the Gutta Percha and Rubber Mfg. Co.; John H. Kelly and Amadee Spadone, vice-presidents, and W. J. Magee, secretary and treasurer.

J. F. Lincoln, executive vice-president of the Lincoln Electric Co. of Cleveland, Ohio, has just returned from a six weeks' trip which took him to all of the important industrial territories in the country. He not only conferred with distributors of the Lincoln Electric motors and Stable-Arc welders but made a study of business conditions in the East, South, West Coast and the Middle West before returning to Cleveland, it is said.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has recently established a branch organization to be known as Allis-Chalmers at Paris, France, to handle the European business of the company. Headquarters will be maintained at 3 rue Tartbout with H. S. Keen, who has been manager of European sales through the company's district office in Paris, as the managing director of the new organization. The company has maintained for many years an office in London, 728 Salisbury House, London Wall, F. C. 2.

Climax Engineering Co., Clinton, Iowa, held its second annual sales conference recently with about fifty manufacturers and dealers of road making machinery in attendance. An informal inspection of the Climax plant was followed by a business meeting and conference presided over by George W. Dulany, Jr., president of the company and at which many interesting talks by executives and members of the company were presented to the visitors. After adjournment of the business meeting, the party attended a banquet and entertainment at the Clinton Boat Club, followed by a dance on the club floor.

Hyman-Michaels Co., Chicago, Ill., announce the purchase through the United Commercial Co., San Francisco, Calif., of one of the largest copper smelters in the world. The purchase covers the Mammoth, Keystone and Kennett properties of the United States Smelting, Refining and Mining Co., Boston, these properties being located at Kennett, Calif. In addition to the plants, the purchase covers all personal properties, including a considerable amount of trackage and railroad equipment. The Hyman-Michaels Co. will probably operate a part of this vast plant for a period of time, and are considering offers at the present time from other large smelting and refining companies for the purchase of the plant in full or in part.

Trade Literature

Baffle Walls. Bulletin on the construction and advantages of the "Beco" type of baffle walls for furnaces. BOILER ENGINEERING CO., Newark, N. J.

Rolling Equipment and Stock. Photographs of rebuilt locomotives for immediate delivery by the SOUTHERN IRON AND EQUIPMENT CO., Atlanta, Ga.

Modern Excavating. Illustrated booklet showing the uses and applications of different types of RUSTON AND HORNSBY, LTD., excavators in the industries.

Sealed Sleeve Bearings. Pamphlet on the advantages of sealed sleeve type bearings for electric motors. WESTINGHOUSE ELECTRIC & MFG. CO., Chicago, Ill.

Power Shovels. Bulletin on Thew Type "C" power shovels. Features center drive continuous-tread trucks, low repair charge and mobility of this type. THEW SHOVEL CO., Lorain, Ohio.

Pneumatic Conveying System. Bulletin No. 513 on the "Dracco" system for conveying and elevating powdered materials. THE DUST RECOVERING AND CONVEYING CO., Cleveland, Ohio.

Concrete Construction in Cold Weather. Pamphlet on the advantages of use of calcium chloride for cement mortars and concrete for cold weather use. THE SOLVAY PROCESS CO., New York, N. Y.

Cutting and Welding Torches. Bulletin on cutting and welding torches for use with oxy-acetylene, hydrogen, calorene, etc., flames. Illustrations and details of these torches. 12 pp. ALEXANDER MILLBURN CO., Baltimore, Md.

Crushers. Interesting and well illustrated booklet called "Experiences of Yesterday are Guides for Tomorrow," which covers a wide range of various applications of Buchanan equipment. G. G. BUCHANAN CO., INC., New York, N. Y.

Pressure Blowers and Exhausters. Bulletin No. 1608 on "ABC" pressure blowers and exhausters featuring type "P." Details of design and illustrations. Tables of dimensions, capacities and data on special uses. 16 pp. 8½x11 in. AMERICAN BLOWER CO., Detroit, Mich.

Isolation of Machinery Vibrations. Bulletin on the use of Korfund plates for the isolation of machinery vibrations in different equipment at various plants. Data on construction of plates and the advantages in their use. Typical installations and diagrams on foundation arrangements. THE KORFUND CO., New York, N. Y.

Osgood Co., Marion, Ohio, has recently published a 4-page rotogravure section in which is shown many views of Osgood shovels, cranes and draglines in use on different jobs throughout the country.

Combination Dragline and Crane. Catalog C, showing Models 60 and 75 Wiley whirleys designed for high lifting capacity. Features long boom, all steel parts, full revolving circle and adaptions to fit uses in various industries. Made for electric and steam drive. Details of construction, equipment and specifications. Illustrations and diagrams. 24 pp. 6x9 in. THE DAYTON WHIRLEY CO., Dayton, Ohio.

Gas, Oil and Electric Cranes. Bulletin 2519 on heavy duty gasoline, electric and oil operated cranes. Details of construction, charts on working range, lifting capacities and tables of dimensions. Illustrations, etc. THE OSGOOD CO., Marion, Ohio.

Jacklifts, Stackers, Steel Frame Platforms, etc. Catalog on the different types of this kind of machinery for use in various industries. Details of design, specifications, special data and price list. LEWIS-SHEPARD CO., Watertown Station, Boston, Mass.

Speed Reducers, Couplings, Conveyor Pulleys, etc. Bulletin on the "Lipe" equipment which includes electric hoists, gear tooth rounding machinery, coil winders, etc. Details of dimensions, specifications, price tables, illustrations. 18 pp. W. C. LIPE, INC., Syracuse, N. Y.

C-E Fin Furnace. Bulletin No. FF1 describing and illustrating new type of furnace wall. Features water cooled type of construction and advantages said to be derived in furnace maintenance and increased boiler capacity from it. COMBUSTION ENGINEERING CORP., New York, N. Y.

Operating Instructions on Engines. Handy little booklet listing all the general precautions to be observed in operating the Climax "T" series four-cylinder engine. Sectional views of engine and all parts numbered so as to secure easy identification. CLIMAX ENGINEERING CO., Clinton, Iowa.

Road Machinery, Crushers and Portable Plants. General Catalog No. 26 on the complete line of road machinery, portable road material plants, screens, etc. Details of construction, design and specifications. Illustrated throughout. 96 pp. AUSTIN-WESTERN ROAD MACHINERY CO., Chicago, Ill.

Revolving Steam Shovel. Bulletin No. 2521 on the Osgood 1-yd. heavy duty revolving steam shovel. Features wide range of adaptability and ready conversion to different types, to make it a four-in-one outfit. Specifications, details of design and data on operation. 12 pp. THE OSGOOD CO., Marion, Ohio.

Crawler Cranes. 48 page book, well illustrated, showing the uses of draglines, shovels, etc. Data on lifting capacities, operating speeds, live pull, tractive effort and line drawings showing dimensions for operating limits are shown. Interesting information on the uses to which various cranes can be put. LINK-BELT CO., Chicago, Ill.

Cable Draglines. Bulletin No. 26-A on type "A" for excavation and loading of sand, gravel, stone, etc.; type "B" for stripping, wasting or piling overburden from gravel pits; and type "C"—a complete portable machine for digging and loading from borrow pits, etc. Details on the construction and design. 8 pp. SCHOFIELD-BURKETT CONSTRUCTION CO, Macon, Ga.

Power Shovel. New bulletin on the Bucyrus 120-B steam or electric 4-yd. full revolving shovel. Describing and illustrating a heavy duty mine and quarry shovel which can be equipped with 4, 3½ or 3 cu. yd. dippers. Considerable space is given to details of the machinery and a number of photographs of operation are included. 32 pp. 8¼x10½ in. BUCYRUS CO., South Milwaukee, Wis.

Storage of Bulk Materials with Power Scrapers. Catalog No. 8 which is a brief review of the subject including detailed description of Sauerman power drag scraper equipment and many illustrations showing their installation in the various industries. Contains much valuable and useful information for all rock products operations. 48 pp. 8½x11 in. SAUERMAN BROS., INC., Chicago, Ill.

Fordson Gasoline Locomotives. Bulletin on new 4-ton Fordson gasoline locomotives. Contains full specifications, table of hauling capacities and description. Features use in places where small, powerful locomotives are needed in the field. DAVENPORT LOCOMOTIVE WORKS, Davenport, Iowa.

Hayward Buckets. Pamphlet No. 625 describing and illustrating representative types of general line of buckets and their applications. THE HAYWARD CO., New York, N. Y.

Locomotives. Illustrated pamphlet showing types of gasoline and electric locomotives made by the VULCAN IRON WORKS, Wilkes-Barre, Penn.